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PICKS and SHOVELS

By O. E. POTTER

The People's Choice?

Westbrook Pegler, that satirical columnist for the New York *World-Telegram* whose vitriolic pen has dug into many a local, national and world problem, has come smack up against the problem of the farm-to-market road. Writing from Scott's Corners, N.Y., recently, he says:

"Considerable indignation has been aroused in our little community—away from it all—by a threat to build a macadam farm-to-market road 20 feet wide. William D. Shine, the town supervisor, a Republican, has been canvassing the neighborhood for several days trying to select a road leading from a farm to a market, according to the requirements of the Federal appropriation for this purpose. The citizens, however, repulsed him in all cases, and not without some anger. William C. Jones, the township road supervisor, also a Republican, spent an entire day last week touring the back roads with an assistant State engineer, but was unable to find a place to put the road. 'It won't cost you anything,' Mr. Shine has been saying. 'The money is there and it has got to be spent for a farm-to-market road which must be made of macadam and must be 20 feet wide.'

"But practically all the farms are rustic abandoned farms. There are a few old apple trees which apple regularly every year of their own accord, but these are strictly amateur apples and not for market."

Pegler goes on to say that the only market anywhere around is the local grocery store, which does buy about 100 ears of corn a day, in season, from two of the old farming farms and about a bushel of spinach and a couple of dozen bunches of beets and carrots. But

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Gravel Aggregate in Asphalt Mixtures

Pit Gravel Can Be Used More Extensively to Build Asphaltic-Type Roads

By BERNARD E. GRAY, Chief Highway Engineer, The Asphalt Institute

THERE is undoubtedly a very extensive field for the use of gravel aggregate which has been overlooked through failure to use the dense-graded type of road-mix surfacing. Thousands of miles of such surfaces are found all through the west, and yet for some reason eastern engineers have not attempted large scale construction by this method. Even in the glacial gravel areas, where gravel roads abound, the surfacing is done with thin treatments, often annually repeated, when by constructing a 2½-inch gravel road-mix surface, a pavement of substantial character would be obtained.

There is much discussion regarding the per cent of aggregate particles that should be crushed in order to produce the necessary stability of surface. The real criterion is road behavior under traffic, and many gravel aggregates in their natural conditions have a very high degree of stability due to the particular shape and surface texture of the particles. In such a case the uncrushed aggregate may develop higher stability than another where as much as one-half would be composed of fractured particles. In other instances, a relatively small per cent fractured greatly increases the strength of the mixture. Studies in the west indicate that as little as 6 per cent added to some fine-graded mixtures makes a material change.

Stability Testing Equipment

These differences in aggregate sta-

(Continued on page 24)

Heavy-Duty Excavators Dig Power Canals on Loup River Project

(Photo on page 40)

A POWER project approaching \$10,000,000 in cost is now under construction with Federal funds loaned to a Public District at Columbus, Nebraska. It is the aim of the Loup River Public Power District to take the normal flow of the Loup River west of Genoa, Nebr., desilt the water and convey it through a series of canals totaling 35 miles in length to a power house at Monroe, Nebr., and another at Columbus, Nebr., for the generation of power to be distributed to municipal and other power consumers. It is estimated that within a radius of 100 miles of the project and within the state of Nebraska there are 285 cities, towns and villages, exclusive of Omaha and Lincoln, with a total population of approximately 267,000, having a peak load of 31,000 kw and an estimated annual consumption of 122,000,000 kwh. Of these, 78 communities with a total population of 132,000 and an estimated annual consumption of 70,000,000 kwh are being served by municipal plants or municipally-owned distribution systems.

Present Construction

At present there are under construction the two power houses at Columbus and Monroe, contracts for which were awarded shortly after the bids were opened on May 24, 1935, the tail race emptying into the Loup River about a mile below its confluence with the Platte River, the embankments for the intake canal to the Columbus Power House, constructed with strict moisture and compaction field control of the material, a reservoir or forebay named

Huge Electric Project to Carry Peak Loads for Nebraska Communities Progressing Rapidly

Lake Babcock, a measuring weir of horizontal V-type construction, 18 miles of canal between the Looking Glass Creek siphon, and the reservoir, and 7 miles of canal between the diversion works and the siphon.

The completion of the project will require the construction of five siphons, five large culverts, twenty-nine public bridges and numerous private farm bridges. The total quantities involved in this unusual undertaking are:

Excavation	11,500,000 cubic yards
Concrete	65,000 cubic yards
Cement	100,000 barrels
Reinforcing steel	4,250 tons
Steel sheet piling	225 tons
Steel penstocks	1,200 tons
Steel gates	350 tons
Structural steel	300 tons

The output of the project upon completion, corrected for canal seepage through the sandy soil, evaporation, and for step-up transmission losses will be 198,000,000 kwh per year. One of the greatest problems of operation faced by the engineers of the project is the elimination of silt from the waters taken from the Loup River. This stream carries almost 6.5 million tons of silt a year of which about 4 million tons will be diverted into the canals, or enough to fill the reservoir in two years if the waters were not desilted. Two desilting basins are projected, the first ½ mile long by 300 feet wide and the second of 800 acres. The importance of the desilting of the waters cannot be overstated for more than one project in that part of the country has been forced into disuse by the complete filling of reservoirs not equipped for desilting.

Tail Race Excavation

The tail race outlet, 4 miles southeast of Columbus, is about 6 miles long from the Columbus power house to the outlet. It has a bottom width of 57 feet and was originally designed for a 1½ to 1 slope, but after excavation had started it was found that the coarse sand would not stand at that slope and the design was changed to 2¼ to 1.

Martin Day Co. of Lincoln, Nebr., contractor for the tail race excavation, used a Bucyrus-Erie 32B dragline on stripping and a Bucyrus-Monighan 6160 with an 8-yard bucket for the canal excavation. The huge pontoons of the walker had cleats because of the ease of slipping on the sand in combination with the slippery top soil. The total excavation on this contract, No. 5, was 3,300,000 cubic yards. The Monighan moved an average of 10,000 cubic yards a 24-hour day, casting to either side and leaving a 6-foot berm at ground level.

An 8-inch natural gas line which

(Continued on page 31)

A GLANCE AHEAD AT WINTER PROBLEMS



Handling Wet Snow on a State Highway in Ohio. See Page 8.

Fast Work on Big Sewer in Residential Section

USING a large ladder-type excavator, collapsible steel forms, and hauling the excavated material back for use as backfill immediately, Russ Mitchell, Inc., of Houston, Texas, was able to complete 40 to 70 feet of 90-inch monolithic circular sewer a day on the PWA project to handle the drainage of the Washington Terrace section of Houston.

The entire project under contract to this company included 3,890 feet of 90-inch sewer, 3,455 feet of 60-inch, 4,069 feet of 54-inch, 1,267 feet of 48-inch, 660 feet of 42-inch, 2,736 feet of 36-inch, 266 feet of 24-inch and 11,710 feet of 18 and 15-inch laterals. The work was handled with two Austin excavators, the larger a Type 600 machine with extensions to 116 inches and the smaller a 42-15 machine with extensions to 90 inches.

A Boarding-House Reach

The sewer was placed at a uniform depth of 24½ feet, the slope being that of the ground surface and very flat. The larger machine is capable of digging trenches to a depth of 22 feet with its present boom, so in order to make it possible to excavate the added 2½ feet without other machinery the contractor raised the front of the machine to a sufficient height to give the added depth by running the power plant section on two sets of cribbing. The crankcase of the engine was so built that it was possible to tip the engine sufficiently without depleting the depth of oil at the lubrication pump suction.

The soil was joint clay for a large section of the contract, the remainder being in gravel. In the clay section it was possible to run with a minimum of sheeting. Two men had to be kept in the trench to break down strips of the clay where the extensions had passed and the clay stood in place. The first operation was to strip the surface gravel with a Thew crane used as a dragline with a ¾-yard Owen bucket. This was followed immediately by the Austin machine digging the full depth of trench in one operation. The sheeting was 2 x 10 and 2 x 12 with three levels of 6 x 6 rangers. In the few sections where quicksand was met tongue and groove stock was used inside the sheeting.

The specifications required a minimum 10-inch wall thickness for the sewer barrel. To insure this thickness even if the sheeting bulged slightly, the contractor allowed 2 inches on either side of the outside of the barrel of the sewer plus the allowance for the sheeting.

All sheeting and rangers were left in place when the trench was backfilled. The sheeting was cut off about 2 feet from the top.

Collapsible Forms for Sewer Barrel

Steel forms, each 10 feet in length, of variable diameters and collapsible for ease in moving, were used in the bottom of the trench. The invert of the forms was set on precast concrete blocks set to grade. Two bevelled blocks set at the side of the invert prevented tipping.

To move a section of form forward the arch and apron was collapsed and then the invert lifted and moved forward on a trolley welded to the ribs of the arch section. Turnbuckles were used to lift the invert free of the grade and then it was lowered into place as soon as it reached the proper position. Following this the arch was moved forward on the track at the bottom of the invert, expanded, oiled and ready for pouring.

With these 10-foot forms the contractor was able to pour from four to seven sections a 10-hour day. In pouring the

Houston Contractor Kept Backfill Close to Digging and Poured 40 to 70 Feet of Circular Sewer Daily

sections they were treated as a single unit with a bulkhead at the end to prevent concrete flowing into the trench. The forms had a tendency to float during pouring from the weight of the concrete so each set was blocked against the middle set of rangers which were placed closer than the top or bottom set for this purpose.

Labor Organization and Hours

The labor organization consisted of three men below for breaking down the material missed by the excavator and who also helped with the sheeting below, and five men on sheeting at the top. There were six carpenters and laborers on the rangers and sheeting, and four men on forms. The concrete crew at the batching plant consisted of two men, and on the pour five men.

The contractor ran two 5-hour shifts daily, each crew working 30 hours a week.



C. A. K. M. Photo

The 116-Inch Trench Excavator at Work. Note the Power End Raised to Increase Working Depth of Buckets.

Maintenance Materials Mixed in 300-Foot Circle

(Photos on page 40)

THE Arizona State Highway Department has many miles of road-mix highways under maintenance. When breaks, ravel or other damage occur similar material ready-mixed is transported to the site and worked into the road surface rather than disturbing an entire section.

One of the best methods of preparing oil-mix material for maintenance is the circular mix, according to Harry Duberstein, Assistant Maintenance Engineer, Arizona State Highway Department. The maintenance foreman gets samples of aggregate for his section by sampling all likely looking material not too remote from the road and sends these samples to the Materials Engineer for testing. In each sample is stated the location, quantity represented, and the source of the sample. On accepted materials, the Materials Engineer recommends the grading and amount of oil.

The Great Circle

The material is then hauled to a level place and spread in a circle about 200 to 300 feet in diameter and leveled off. The oil is then applied. Beginning at the outside of the circle a motor grader blades the material to the outside until the grader is on the inside

Batching and Pouring Concrete

A 70-foot section of sewer required about 85 cubic yards of concrete. Since the only ready-mixed concrete plants were on the other side of town, necessitating a long haul through the congested traffic of the heart of the city, the contractor decided upon setting up his own batching plant near the job and mixing the batches in a 27E Rex paver on the site. This worked out very well.

The batching plant was about an average ½-mile haul from the sewer. The contractor set up a Butler batcher and bin, loading with a P & H crane with a 40-foot boom and a 1-yard Hayward clamshell bucket. The batches with the cement were hauled out and dumped in the paver skip, mixed and chuted down one or two metal-lined wood chutes to the forms without segregation.

The specifications required 72 hours' cure before the forms were removed and the trench backfilled. This left an average of 150 feet between the excavator and the completed backfill, not a large area of hazard to the city traffic.

Personnel

This contract was awarded to Russ Mitchell, Inc., of Houston, Texas, for \$260,000.00. C. H. Everett was Superintendent and Alvin Boozer, Foreman for the contractor. The work was done under the general supervision of J. M. Nagle, City Engineer.

Sanding Highways in Rhode Island

By D. A. SOULE, Maintenance Engineer, State Board of Public Roads

Our program for sanding state roads calls for stockpiles of screened sand treated with calcium chloride in a proportion of 150 pounds to each cubic yard of sand. These stockpiles are located at suitable distances along highways, the distances varying according to highway conditions such as hill curves and the prevalence of icy conditions in certain localities.

Our regular maintenance trucks, operating from each of the five maintenance divisions throughout the State are equipped with sanding machines for this work. We favor the type sanding machine which spreads by means of rotating discs, driven by belt from the wheels of the truck. Each truck is operated by a driver and two laborers, and in general one truck equipped will take care of sanding about 15 miles of highway.

It is our practice to sand hills, curves and intersections whenever the pavement is icy and the straightaways only if it is glare ice.

My observations convince me that complete sanding every time the road becomes slippery is unwise, as no saving of icy pavements can take the place of brains in the handling of motor vehicles on such pavements, and the sanding of all pavements when at all slippery tends to build up a sense of false security in drivers that take their responsibilities lightly.

3,500 gallons of oil are required, costing \$325.00. Where the material is state owned, the cost is about 3 cents per cubic yard, or a total of \$60.00. This gives a total cost of \$730.00 for mixing 200 cubic yards or \$3.65 per cubic yard.

The stockpile is left on the spot as used as needed for patching. In screening materials for the mix, extra sized materials are developed for blotting seal coat.

Making the Repair

Bad road ravel or breaks are covered out in the failed area and backfilled with new stock. Patches are dug out square sections to neat looking lines. The old material is wasted along the shoulders.

A 300-gallon patch unit on a trailer is equipped with spray attachment, gas pump and engine. This equipment is used for prime coat and seal coat spraying. Storage tanks for oil, usually of 7,000-gallons capacity, are located on the railroad points near the maintenance station, with one to each section. Power brooms are used for sweeping excess blotting materials, which are spread with hand shovel. In Arizona there are 880 cubic yards of oil road in a mile. The maintenance cost including the stockpile, oil patching, shoulder work and drainage repairs about \$250.00 per mile. The straightaway method formerly used for mix material for maintenance took 10 days to mix 200 cubic yards at a cost of \$5.50 per cubic yard. The excess cost and extra time was due chiefly to many turns, causing the inevitable loss of lost motion.



The Trailer Patch Unit with 250-Gallon Oil Tank, Pump and Spray

Traveling in Circles Disproved Old Theory of Shortest Distances on Road-Mix Repairs

of the circle. The angle of the blade is then changed and the material is worked to the inside. The grader remains traveling in the same direction until the batch is thoroughly mixed. About 200 cubic yards are mixed by this method at one time.

The spreading of the oil is done by a common water tank of 300 gallons capacity with an opening in the bottom, pulled over the spread material by the truck used in hauling the material.

Equipment Needed, and Cost

The equipment necessary for this mixing operation and the preparation of the material prior to mixing is a set of screens, a truck, oil truck, disc and motor grader. The labor used is two men screening, a truck driver and a motorgraderman. It takes about ten days to make up a 200-cubic yard mix.

The cost for the work is as follows: labor screening, two men, four days, \$40.00; truck driver, ten days, \$50.00; motorgraderman, ten days, \$55.00; labor total, \$145.00. The equipment cost is \$200.00 including gas and oil. About

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PWA vs. WPA—

Thrifty or Spendthrift

The President of the United States has taken a definite stand in the Ickes-Hopkins controversy as to whether PWA or WPA will have the upper hand in spending the emergency relief money appropriated by the Congress. Ickes believes that emergency relief money should be spent for lasting public works projects, which will constitute a capital investment for the entire country and which will provide future employment and stimulate expenditure of money by private industries to absorb further unemployed labor. On the other hand, Hopkins wants to see quick projects hastily conceived in which a greater proportion of the money will go direct to labor.

Thus, we see before us the picture of a huge political machine fed by Federal relief funds, its pockets filled with Federal relief money up to the time when its votes will be needed to continue the spendthrift New Deal in office. Our protest is not against the expenditure of Federal funds, but rather the manner of the spending. We do object to the welfare of the country being discarded for the welfare of the New Deal ballot box in 1936.

"Men Working"

All manner of facetious remarks are heard in hotel lobbies and wherever motorists gather over the "Men Working" signs seen along our highways. The fact that it is necessary to advertise that men are working when they are seen to be leaning on their shovels seems to appeal to the humorous side of the American motorist.

There is a truly serious side to the "Men Working" signs. These signs are placed on the highway as a safety measure to warn the motorist that he may expect to find laborers working on the shoulder or the roadway itself or that he may shortly encounter trucks hauling maintenance material. The fact that these signs are left on the roadway from the time a crew starts work in the morning until quitting time at night, when during a large proportion of the time the crew is actually engaged in work elsewhere, has led to a very general disregard of the warning "Men Working." We have watched motorists in many states and noted that there is

less and less slackening of speed in passing these warning signs.

State highway officials should see that these warning signs are left on the roadway only when men are actually working in that section, in order that the motorist may realize that the signs "Men Working" mean something and regard them with greater respect.

"It Can Be Done"

Readers will recognize these words as having fallen from the lips of an ex-Governor of New York State when, in gloating over the completion and dedication of White Face Mountain Highway at Lake Placid, N.Y., he called attention to the obstacles, political and otherwise, which had been overcome in order to insure the construction of this 8 miles of pleasure road which now can be traversed in short time at \$1.00 per automobile. Given unlimited funds, American engineers and contractors can build almost any project, economic or otherwise. Under the pressure of enforced Federal spending today our engineers and contractors are designing and building many projects in the "otherwise" class. An example, one of many, is the Passamaquoddy tidal power project in the State of Maine. Private interests employed engineers of national reputation to study this project years ago and the reports came back "you can't get your money back."

If the Passamaquoddy project does ever reach actual construction, we shall see ingenious designs created, remarkable construction records set up and the work will be a credit to civil engineering construction as is Wilson Dam at Muscle Shoals today. "It can be done," but the people of this nation must force their leaders to give more thought, sound, sane, constructive thought, to the economics of every structure and project into which the taxpayers' money is being poured. Creation of temporary work today by artificial means resulting in devastating taxes within five years will create another crushing depression in 1944, a sad circumstance already being discussed seriously by sound thinkers in Washington.

Spend wisely for productive projects which will provide continuing employment and create self-respecting citizens from the rising generation.

choose those to be undertaken.

Meanwhile, Secretary Ickes announced that the new \$200,000,000 public works program was ready and promised that it would be the fastest and best that could be provided with the money available.

Mr. Ickes admonished the directors to be "absolutely objective" in working out the final list of jobs so that there could be no accusations of favoritism.

The President has said that the projects must be under contract by December 15, completed within a year, located in areas where people on relief can be used for labor, and cost no more than \$850 per worker annually.

Prosperity of World Depends on Its Roads

The First of a Series on Types of Roads and Problems of Construction in Other Parts of World

(Photos on page 40)

THERE are 9,152,282 miles of highways in the world, enough to circle the earth 366 times. In spite of the world-wide economic depression which naturally slowed up highway construction, some progress has been made throughout the world the past few years, sufficient to be encouraging to those interested in better roads, even when compared to the rapid development made during the years just preceding the lag in public works.

Transportation and Prosperity

The unparalleled expansion of the automobile industry during the last 15 years, the consequent emphasis placed on highway construction and improvement, and the revolutionary effect that the growth of highway transportation facilities has had upon the economic and social life of the peoples of even the most remote and undeveloped countries, are matter of world-wide interest.

Not the least of the factors affecting the prosperity of any country is land transportation. No new country can hope to reach full development, nor an old one continue to progress without adequate and continued attention to land communications, of which highways are of outstanding importance.


The relation between transportation facilities and the development of a country is shown in some interesting statistics compiled by the Bureau of Foreign and Domestic Commerce. Bermuda, for example, that fairly prosperous tourist haunt, has one mile of road for every 0.2 square mile of island. On the other hand, French Guiana has 1,240.8 square miles of territory to every mile of road. The British have crisscrossed British India with highways to such an extent that, in spite of the obstacles of mountains, jungles and climate, there is a mile of road for every 9.1 square miles of country, while Arabia has 947.9 square miles (mainly of desert) for every mile of highway.

A study of these mileage figures of the backward countries, some of them great in area, shows at once that they are handicapped in the race for commercial development and a greater participation in world trade by the absence of adequate national highways to reach all parts of the country by motor car or truck. An example of this is the comparison of the highways of China and Japan. China, with an area of about 400,000,000 square miles and a population of some 444,000,000, has 51,056 miles of roads. On the other hand, Japan, with an area of only 147,327 square miles and a population of about 64,000,000, has a total of 594,626 miles of roads, roughly twelve times as much mileage as China.

Our Part in World Road Building

The people of the United States have a direct interest in the road building of the world. American road rollers, scrapers, graders and mixers are at work on every continent. Practically every country in the world knows the bite of American power shovels, and uses American tractors and trucks in building and maintaining its roads. In addition, the prosperity of this country is to considerable extent dependent upon the prosperity of the world.

In subsequent articles, the roads and



Arm Caught and Broken

WHEN MAN TRIED TO CLEAN IDLER IN MOTION

Stop Conveyor Before Cleaning

National Safety Council

Accident Prevention Is Economy

Contractors are generally alert to guard against possible losses due to improper purchasing and faulty supervision and planning, but as a rule give little consideration to guarding against accident or injury losses, said Welton A. Snow, Director of the A. G. C., in a paper presented before the Virginia State Safety Congress.

Aside from the humanitarian argument for accident prevention, accidents cost money. Even though employees are covered by workmen's compensation or liability insurance, the contractor pays in the form of premiums, as well as the loss in production, time, confusion, replacing of men and sometimes material when an accident occurs.

The important factor is the attitude of the boss. If he is completely sold on safety and makes a sincere effort to eliminate accidents, his spirit will be reflected in those he employs. A program of safety education will help tremendously in bringing home to the men the importance of safe practices in their work. Safety posters also help. The little money spent in this manner may prevent an accident, the cost of which might be at least a hundred times as great.

The Associated General Contractors of America have for many years carried on an educational campaign for the elimination of accidents in construction and conducts safety contests among its members. The records made by the contestants show that safe practices reduce accidents and their resulting costs.

Concreting in Cold Weather

Concrete information on concreting in cold weather with sure, satisfactory results is contained in Sheet ST21 recently published by the Portland Cement Association, 33 West Grand Ave., Chicago, Ill. Methods of performing various operations are illustrated and detailed specifications given. Copies of this bulletin may be secured by readers of this magazine direct from the Association.

road building on the various continents will be discussed in some detail. In the meantime, the following table furnished by the Bureau of Foreign and Domestic Commerce, serves as an interesting summary of the present status of highways throughout the world.

Highways of the World

No.	Area Square Miles	Road Mileage	Area to 1 Mile of Road
North America	7,345,134	3,476,895	2.1
Cent. America	982,249	66,767	14.7
West Indies	90,992	20,292	4.5
So. America	7,296,180	326,973	22.3
Africa	10,790,969	392,389	27.5
Asia	9,498,323*	1,026,579	9.3
Europe	10,399,225**	3,386,069	3.0
Australia, N. Z. and Oceania	3,158,603	323,067	9.8

*Exclusive of Asiatic Russia.

**Including Asiatic Russia.

800 Millions More Go to WPA Work

By executive order of the President, an extra \$800,000,000 of the work relief billions has been dropped into the coffers of the WPA for its campaign to put to work by November 1 the 3,500,000 persons now on relief.

WPA state programs to cost \$724,784,082 have already been approved but Harry L. Hopkins, WPA Administrator, has stated that twice as many projects as could be financed with available funds would be approved, in order to give the state administrators a wide selection of projects from which to

Excavating Cofferdam at Miss. River Dam 16

HAVING completed the construction of Lock 16 at Muscatine, Iowa, last year, the Central Engineering Co., of Davenport, Iowa, bid on the second part of the Mississippi River program at this point, the construction of the dam. They received the award and started driving the steel sheet piling for the cofferdam February 15, 1935.

The dam consists of a concrete abutment on the Iowa side with 1,700 feet of ogee spillway section and an abutment, then 400 feet of dredged fill, a portion of which is over an existing island, an abutment at the end of the fill, ten 40-foot Tainter gates, four 80-foot roller gates and five more 40-foot Tainter gates, ending the present contract at the river wall of the earlier contract for the locks.

Cofferdam

The first section of cofferdam 400 x 700 feet consisted of 26 to 45-foot lengths of 19½-inch web Inland steel sheet piling driven with a No. 7 McKiernan-Terry steam hammer from a Clyde-Wiley steam crane. The 26-foot lengths were used in an old sand bar for a single line cofferdam and the longer lengths on the outer sections in the river. The inner line of piling of the double coffer was 37 feet in length and the cells between were filled with material dredged from the inside of the coffer. The cells were 26 feet between lines of piling.

Inside the cofferdam and from the island a grade was cut on a 2 per cent slope for a standard railroad track which will bring in all materials for the construction of the masonry and steel work of the dam, except aggregates and cement.

The second section of the cofferdam, measuring 400 x 600 feet, will be driven soon after the first section is pulled, about the first of November, 1935.

Dewatering

For pumping out the cofferdam the contractor used a battery of two 8-inch Dayton-Dowd centrifugal pumps and six 8-inch Moretrench pumps on a loop of 1,600 feet of 8-inch header with 400 wellpoints with 1¼-inch risers and in lengths varying from 15 and 20 to 25 feet. The wellpoints were jetted with a firehose. This system provided a dry bottom for all the excavation and concrete work in the fine sand and silt of the river.

Excavation

All excavation was in the dry within the loop of wellpoints. Underlying rock was found at elevations 10 to 30 feet below the bottom of excavation and very uneven in elevation. The lowest excavation was carried to 30 feet below the top of the outside sheeting. The major portion of the excavation was handled by four Koehring cranes; one 301, two 401's, and one 502. Assisting in miscellaneous excavation was a Bucyrus-Erie steam crane with a 75-foot boom which handled the work on the railroad grade and also assisted on heavy work as it could swing 10 tons at a 50-foot radius. This machine is the only piece of equipment purchased second hand by this contracting firm which prides itself on the character and maintenance of its large plant for this type of work as well as for highway construction. The Clyde-Wiley machine was used with its 100-foot boom chiefly for driving the cofferdam and placing concrete. It could handle 10 tons at a 60-foot radius. The Koehring cranes were used as draglines throughout the excavation and then the 502 used to feed the concrete plant direct from barges alongside the cofferdam.

Central Engineering Co. Completed Lock 16 and Now Pushes Work on Dam to Finish Iowa Project

The material excavated within the cofferdam was first used to bank the single line of steel sheet piling on the island section to within 2 feet of the top of the piling inside and out. The balance was used between the two lines of piling in the river portion.

Lighting and Power

A power line was brought in from the Iowa shore over the trestle and dredged fill over which the railroad spur track was laid later. The power came in at 6,600 volts and was stepped down to

440, 220 and 110 volts. The dredge had a special transformer for current at 4,000 volts.

Floodlights for night work were spaced at 100 to 250-foot intervals around the cofferdam on top of the piling and were equipped with 200 to 1,000-watt lights on the 220-volt line. During excavation and throughout the work the job was run 24 hours a day but only a small crew worked at night during the earlier part of the work. When it came time to concrete a larger crew worked throughout the 24 hours.

Concreting

The concrete work for the dam consists of a 90-foot apron running the full length of the dam and between the piers of the gates a sill, the bottom of which is 30 feet below the top of the outer sheeting. The concrete plant was set up on the fill between the double sheeting on the river side where the barges of aggregates and cement could be moored alongside. An automatic Blaw-Knox batcher plant similar to that used

for the concreting of the locks last year will furnish the material to be placed by a double unit Pumpcrete machine. The bulk cement will be furnished by the Dewey Cement Co., and the aggregates by the Automatic Gravel Products Co. of Muscatine, Iowa. Blaw-Knox forms designed specially for this work will be used for all the concrete.

Working Hours and Labor

The working hours for this Public Works contract are from 7 A.M. to 12 Noon, 12 Noon to 5 P.M., then an hour out, 6 P.M. to 11 P.M., 11 P.M. to 4 A.M. and then 3 hours out. The time out is used for greasing and fueling the equipment.

During the driving and excavating of the cofferdam about 125 men were employed on all shifts, but during concreting this will be increased to between 400 and 500 men.

Miscellaneous Plant

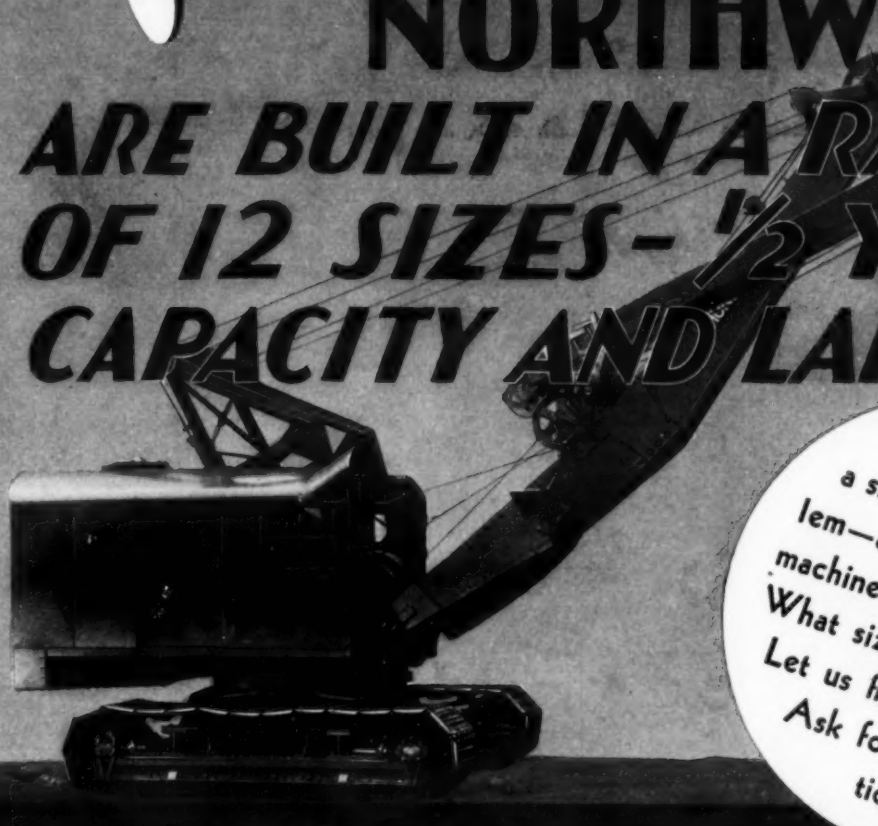
On the island formed by the original

(Continued on page 27)

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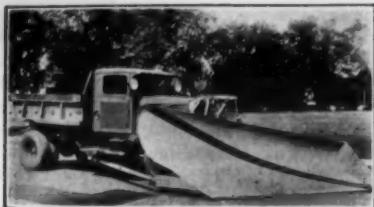
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NORTHWEST ENGINEERING CO., 1727 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.





A Model 60 Champion Snow Plow

Equipment for Snow Fighters

For the coming winter season, the Good Roads Machinery Corp., Kennett Square, Pa., has developed many improvements in its line of highway snow plows, and has added several new models in one-way and V types.

Among the features of Good Roads plows is the safety automatic blade release mechanism, safeguarding men and equipment; the hydraulic lifting devices, fully adjustable for attachment to all trucks; quick adjusting blade feature, for changing the vertical pitch and cutting angle of the blade to cope best with wet, medium or dry snow conditions; the improved method of semi-circle attachment to the moldboard, with varying adjustments available; and the full-swivelling, roller-bearing spring-mounted caster wheels with Alemite lubrication fittings to support the plows. The casters are adjustable for height to compensate for any wear on the cutting edge, and this same feature is used to set the blade at any desired height, within limits. The method of connecting to trucks provides free oscillation of the plow, thus allowing the blade to conform to the contour of the road.

Good Roads Champion plows for streets and highways are made in a wide variety of types and models for meeting any condition of snow fall, in sizes suitable for use with all standard trucks of from 1½-ton capacity to the heaviest built.

Foote Moves Chicago Office

The Foote Co., of Nunda, N. Y., has moved its Chicago office to 2139 West Fulton St., Chicago. Both day and night service is available, and a complete stock of parts for both MultiFoote concrete pavers and Adnun black-top pavers is maintained.

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GOPHER
SHOVEL



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DERRICK COMPANY**

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CONTRACTOR'S, INDUSTRIAL
AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA

All-Wheel-Drives For Light V-8 Trucks

The all-wheel-drive principle has now been applied to Ford V-8 trucks by Marmon-Herrington Co., Inc., Indianapolis, Ind. By installing a specially designed driving front axle and propeller shaft, a two-speed auxiliary transmission and other necessary parts, even greater power has been added to the Ford V-8 trucks.

All installation and conversion operations are done at the Marmon-Herrington factory in Indianapolis. There are four models in this group of which two are four-wheel-drive units. These are the B5-4 with a wheelbase of 132 inches and the B6-4 with a wheelbase of 157½ inches. In addition there are two six-wheel-drive units.

The added traction and improved, "off-the-road" performance are thus made available in the lighter trucks. The front axles are full-floating, single-reduction with Marmon-Herrington No.

1 constant-velocity universal joint steering ends. The two-speed auxiliary transmission gives a total of eight speeds forward and two reverse, and makes possible a maximum gear reduction of 88.5 to 1. Both the four and six wheel-drive units are available with three tire sizes—6.00 x 20, 7.00 x 20 and 32 x 6.

Self-Priming Centrifugal Operates Without Floats

A positive priming device which is automatic, has no floats or hand-operated valves, no recirculation and is designed particularly for sumps and isolated water supplies, has been developed by Worthington Pump & Machinery Corp., Harrison, N. J. This Worthington built Hytor positive primer is placed on the same shaft with the motor and pump. The only requirement is a reasonably tight suction line.

When this Monobloc pump, with the latest impeller design, is primed, a pres-

sure-operated cut-out automatically unloads the Hytor. The priming device has been exhaustively tested for 10,000 starts, equivalent to more than 30 years operation under severe conditions. The pump is available for single or poly phase 50 or 60-cycle alternating current as well as for direct-current operation. A descriptive bulletin on this pump may be secured from Worthington.

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TARPAULINS
WINDBREAKS**

The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaulins, Tents, Windbreaks.

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A CLETRAC 35

BUILT 2.2 MILES of
MOUNTAIN ROAD

IN
250
HOURS



● Working in the Colorado Rockies at an altitude of 10,000 feet, a Cletrac 35 built 2.2 miles of road in 250 hours. At 10,000 feet atmospheric pressure is reduced about one-third and seriously affects motor performance. Yet Cletrac developed power enough for the job—as evidenced by the record. Cuts were from 3 to 20 feet deep, and much of the material

blasted rock, the balance mountainside boulders.

All over the country Cletracs are making records for power, production and economy on all types of road building, earth moving and other civil engineering projects. Cletracs are built in 20, 25, 35, 55 and 80 h. p. models with gas power, and in 40 and 80 h. p. with Diesel power.

THE CLEVELAND TRACTOR COMPANY, Cleveland, Ohio

CLETRAC CRAWLER TRACTORS

Advertisement

Solving the Unknown Factor in the Highway Equation

Snow removal is the unknown quantity in highway maintenance. The snowfall for a season may be light, or it may be heavy and keep the maintenance crews hopping from morning to night throughout the season. Like forecasting political campaigns, sporting events and the stock market, the safest prophecies about snowfall are made after the event is over. Perhaps the safest generality that can be made on the subject is to have ample equipment available. A few unused snowplows are a great deal cheaper than even a few hours' blockade of important arteries.

There is a distinct and commendable tendency in snow removal work to use a larger number of comparatively small trucks with snow plow attachments instead of a small number of larger snow fighting units. The reason for this is that the smaller units are more easily shifted from one location to another, can generally get out to the job faster, involve a smaller investment expense, and can be more easily adapted to the variable snow conditions.

Mounting Attachment

An efficient truck for a snow plow fighting unit should be easily convertible so that the plow attachment can be removed or mounted making it possible to release the truck for normal duty when it is not required for the job of removing snow. For different depths of snow, different types of blades should be used. For drifted snow a V-type plow should be used, whereas for comparatively light shallow snow a straight blade either of the reversible or one way type is preferable. Therefore, a good attachment for trucks should be so designed that at least three different blades can be mounted on one push frame.

The method of pushing the snow blade and utilizing the full power of the truck is very important. The system of applying underframe push members and engaging the truck frame near the center of gravity is the method now approved. With this system, no excessive weight is placed upon the front truck springs, and there is a minimum tendency for side draft to interfere with easy and accurate steering.

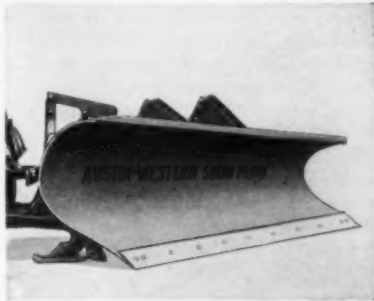
Blade Control

A number of different types of blade control mechanisms have been designed and tried. The most practical is classified as "hand hydraulic." With this system a simple double acting hand pump is mounted in the truck cab which is connected by a heavy steel reinforced rubber hose to a ram out on the plow frame. When the operator works the pump lever, oil pressure is developed in the ram which in turn raises the plow. In order to lower the plow the operator merely opens a hydraulic pass valve located on the pump which allows the pressure in the ram to recede and the blade to return to any desired position.

With this hydraulic system, there are no worm and gear mechanisms which often become clogged with ice and snow. Neither is it necessary to provide a hole in the windshield of the truck or any other part of the cab with which to accommodate the hand wheel shaft. The pressure hose of the hydraulic system generally goes through the floor board, through the motor compartment and out the side of the hood to the ram, making a very neat and trouble-proof system. In operation it is proof against the conditions which accompany winter storms—particularly freezing which is prevented by the use of an extremely low cold test ice-machine oil.

Advertisement

There are different methods of carrying the cutting edge of plows at varying distances over the pavement or road surface. Some prefer flat steel runners, whereas others specify wheels or swivel



The one-way plow for clearing streets at high speeds has a blade curvature in excess of a reversible blade. This extreme curvature reduces friction by rolling the snow, while eliminating its tendency to fly over the blade and back against the truck windshield.

Advertisement

casters. The latest development in the caster type equipment is that of having hard rubber tires, fitted to the caster rims with the caster itself mounted in anti-friction swivel bearings. With this system the casters automatically align themselves with the direction of travel.

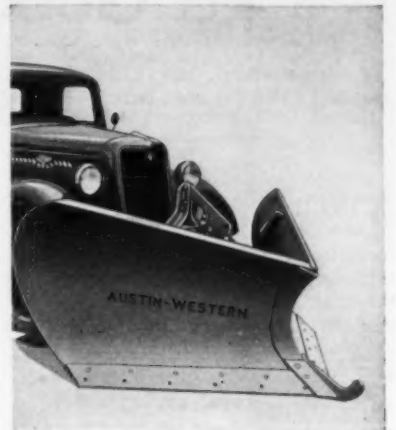
These features of good snow plow equipment have been developed from a number of years of experience. It is with these principles that the Austin-Western truck snow plows have been designed.

Life was simpler a hundred years ago. A family produced its own food and stored the winter's supply in the basement. Today with a growing proportion of the population in cities and therefore dependent on open highways for their milk supply, an effective snow blockade could have serious consequences not to mention the inconvenience to the public.

With the great number of trucks available, motive power for snow removal is always at hand. Delays in

Advertisement

keeping the traffic lanes open can usually be traced to lack of snow plows.



The Austin-Western V-Type Plows because of their weight distribution clear drifts at a minimum of strain on the truck.

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AURORA • ILLINOIS, U.S.A.

Gentlemen:

The responsibility of a manufacturer to the industry he serves is a serious one. Years of work are sometimes devoted to the preparation of a single new feature. For four years Austin-Western has been pioneering in the development and application of Hydraulic Controls to earth moving equipment and road machinery.

The announcement now made is of far reaching importance. Every test of experience on every type of work has proved that Austin-Western Hydraulic Controls operate more effectively, and cost less, than any other control on similar equipment today.

The new efficiency and greater operating economy can be directly measured by extra profit to contractors. States, counties and municipalities receive the same advantage in lowered maintenance and construction costs.

Easy operation, quick response, absence of moving parts, elimination of power lag, and simplicity of maintenance are combined in a new performance for each machine - an improvement whose full extent is realized only in watching the machines at work.

It is our positive belief that this achievement marks a trend: Hydraulic Controls, now standard on Austin-Western Machines will, within a few years, become standard for the industry.

Yours very truly,

THE AUSTIN-WESTERN ROAD MACHINERY CO.

S. F. Beatty President

A STATEMENT

TO ENGINEERS, PUBLIC OFFICIALS AND CONTRACTORS

by *S. F. Beatty* PRESIDENT

THE AUSTIN-WESTERN ROAD MACHINERY COMPANY

Snow and Ice Removal —a Good Investment

By S. O. LINZELL
Assistant Chief Engineer, Bureau of Maintenance, Ohio Department of Highways

(Photo on page 40)

THERE are two phases of a highway department's activities which can do more towards "selling" it to the public than any other. These are, first, the thorough and proper handling of snow and ice, and second, the maintenance of good detours when detours are necessary.

Snow Removal an Investment

The snow and ice problem has been handled very haphazardly at times. Ohio is attempting to go into these winter problems with more care and thought by properly organizing and equipping to meet them. The idea that handling snow and ice is an expense and drain on highway funds is being displaced by the newer thought that the money spent on snow removal and ice control is an investment that pays dividends in increased gas tax revenues. While there is, unfortunately, no definite data available to prove this point, observation of the volume of traffic on a well plowed highway, compared with the volume on a snow covered highway, should settle the question in the minds of the dubious.

In Ohio there are great extremes of weather in different portions of the state. The northeastern portion has an average annual snowfall of over 50 inches while the southwestern corner averages less than 20 inches. The portion of the State that has the heaviest snowfall is also the most densely populated, and consequently has the most highways per square mile and the greatest traffic density on the highways. Icy pavements are one of the greatest nuisances to the motorist, and have really been a more difficult problem than snow.

Fast Plows Are Best

Before going further into the subject of actual preparations for snow removal and icy pavement treatment, it would be well to mention a few of the fundamentals of the problems, and some of the things we have learned from past experience. One is that light, fast snow plows starting with a snowfall and keeping up with the storm are more efficient than the heavy, slower plows which were thought necessary in the past. Heavy-duty, slower snow plows are very good for drifts or deep snows, but it is very seldom here in Ohio that the snow cannot be handled with the light, speed plows, provided, of course, no organization lets the snow get ahead of it.

Spread Grit on Ice Mechanically

A second lesson we have learned is that it pays to spread abrasives on icy pavements with a good mechanical spreader. As little as 5 cubic yards of abrasive material will cover a mile 10 feet wide when applied in this manner while hand-spreading or tail-gating

Buckeye Highway Forces, Well-Prepared for Battle, Start Work as Snow Begins Using Fast Truck Plows

of abrasives is slow, inefficient and wasteful of abrasive material. A third point is that few spreaders are efficient on all types of abrasives. The spreader that handles uncrushed cinders well is not so good on wet sand, and vice versa.

Preparation Half the Battle

Needless to say, though often forgotten, being prepared to fight snow and ice is half the battle. The first activities toward preparing for the winter consist in hauling and stocking abra-

sives, such as cinders, sand, stone, screenings, and even coal mine slack, at strategic points along the highways. Much of this is done in the late summer and early fall during slack periods when trucks can be spared for the purpose. On particularly bad hills, curves or intersections, stockpiles are sometimes placed close together so that material can be spread directly with a hand shovel. Some places in Ohio, along important highways, storage bins for abrasives have been constructed which enable trucks to be loaded from chutes in five minutes as compared with twenty minutes for hand loading. This results in much more efficiency from equipment, and more storage bins are to be constructed at strategic points for this purpose.

Hand loading of abrasive material is very slow and inefficient, and generally consumes from 40 to 50 per cent of the time of truck and crew while on this type of work.

Stockpiles are treated when necessary with calcium chloride. This practice is

important where the abrasive is wet, and where temperatures run low. From 50 to 100 pounds of calcium chloride (Continued on page 19)

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Roi 12-hp. gasoline engine. Capacity:
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EQUIPMENT

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When contractors Edward H. Ellis, Inc., and Burkett Construction Company were awarded contracts for 4,000,000 cu. yds. of dry excavation on old, historic Delaware Canal, it was natural that they should take advantage of the low-cost earthmoving of LE TOURNEAU equipment.

Ellis bought six 12-YD. CARRYALLS* and one 75 BULLDOZER. Burkett purchased three 12-YD. CARRYALLS*. Work began September 3, and today these ten units are busy widening, deepening, and straightening the Delaware Canal—proving on another huge job that LE TOURNEAU equipment moves more yardage more quickly and cheaper.

● (Upper Right) LE TOURNEAU CARRYALLS* digging into the fine sand, originally hydraulic fill, along the Delaware Canal.

● (Center) Two of six CARRYALLS* at work on the north bank of the Delaware Canal near Chesapeake Bridge.

● (Below) Subcontractor Eichacker's tandem of two 12-YD. CARRYALLS* on the move beneath the Sagamore Bridge along the Cape Cod Canal.



● THREE CARRYALLS* AND BULLDOZER MOVE ON-TO CAPE COD CANAL

When Merritt, Chapman, Scott Corp. won the contract to widen the present Cape Cod Canal, Ed Eichacker, pioneer Eastern user of LE TOURNEAU equipment, sub-contracted 150,000 cu. yds. Today his tandem hookup of two 12-YD. CARRYALLS* SCRAPERS, an 8-YD CARRYALL* and a BULLDOZER are working on this job, almost

within shouting distance of Plymouth Rock.

Thus, LE TOURNEAU equipment rolls onto two more major earthmoving projects and assures profits to three more contractors. Ask your tractor dealer for data sheet proof telling what LE TOURNEAU equipment is doing on earthmoving jobs the country over.

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Firestone patented construction features make it possible for Firestone to build this tire. The body is built with Gum-Dipped High Stretch cords. Gum-Dipping is a Firestone patented construction feature which soaks and coats every strand of every cotton cord with pure liquid rubber. This makes the body of the tire stronger to withstand the stresses and strains of the extra pulling power of the Ground Grip Tire.

The massive super-traction tread is locked to the cord body by two extra layers of Gum-Dipped cords under the tread (patented).

The tread is scientifically designed so that it is not only self-cleaning, but it does not bump when used on paved roads.

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6.00-20	\$16.95
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32x6 Truck Type	27.65
32x6 H. D. . .	36.25

Other Sizes Priced Proportionately Low

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Hazard to Newly-Weds Removed by Blasting

The recent work of removing a portion of Table Rock at Niagara Falls was to most people just another event in the ever-changing conditions at the Falls. But for the engineers in charge of the blasting operations, it was a ticklish business. The purpose of the work was to remove what the engineers of the Queen Victoria Park Commission considered a dangerous hazard to the safety of sight-seers and at the same time, preserve as far as possible one of the most popular points of observation in the Park.

Table Rock extended about 250 feet from the edge of the Falls along the Canadian side of the gorge and projected as much as 25 feet in spots out over the gorge. In 1927 it was noticed that an inch-wide crack was developing in the Rock, roughly coinciding with the face of the rock below. In December, 1934, a section of the rock, 65 feet long and weighing between 1,500 and 2,000 tons, broke off and fell into the gorge. Investigation this spring showed that the crack had developed along the entire length of the overhanging rock, making the observation point unsafe, and making it necessary to drop the rock into the gorge by means of explosives.

The blasting problems were many. It was necessary to shoot hard enough to throw out the overhanging rock and at the same time not disturb the rock underneath or cause any unnecessary back breakage on the face of Table Rock itself. This meant firing several very small shots instead of moving the entire rock at one time. Black powder of the coarsest granulation was selected as the principal explosive, although a small amount of dynamite was used in each hole.

The use of black powder brought another problem. Due to its proximity to the Canadian Falls, Table Rock is constantly soaked by the spray, which is heavy enough at times to resemble a hard rain. This difficulty was overcome by loading the black powder in long tin containers, with tubes at one end to permit priming with electric blasting cap. These openings were closed with soap, after priming.

The rock to be shot was about 100 feet in length, 40 feet deep and 25 feet wide at the top. Each blast moved about 750 tons of rock. Jack hammer holes were drilled with 1 3/4-inch steel, 14 feet deep, 12 feet back and 2 feet apart. The holes were loaded with three sticks of 60 per cent Polar ammonia dynamite in the bottom and 4 1/2 pounds of black powder, K granulation, on top. The holes were not sprung before shooting.

The dynamite was used to obtain a better shear at the bottom of the hole, with the slow-acting powder heaving the rock over the side. The holes were

primed with electric blasting caps, connected in parallel and fired from a power circuit.

The work was planned and supervised by the engineers of the Queen Victoria Park Commission, and the actual blasting was done by officials of the Queenstown Quarries of St. Davids, Ont.

New Dealer in Maine for Chain Belt Co.

The Chain Belt Co., of Milwaukee, Wis., has announced the appointment of the Eastern Tractor & Equipment Co., 315 Forest Ave., Portland, Maine, as distributor in the State of Maine for the complete line of Chain Belt contractors' and logging equipment.

The Eastern Tractor & Equipment Co., which was organized in 1933 by C. R. O'Brien, has a branch office at 632 Maine St., Bangor, Maine. Parts stocks and service departments are maintained at both offices.

What a pity to cut the pavement for pipe-laying, when you can bore under it so easily with a

YOUNG'S ROAD CROSSING BORING MACHINE

This boring machine has tested and proved its ability to install pipe lines under paved highways, railroad crossings, etc., at a far less cost than you have ever hoped for, and without causing any "slow orders" on the railroads or detours on the highways.

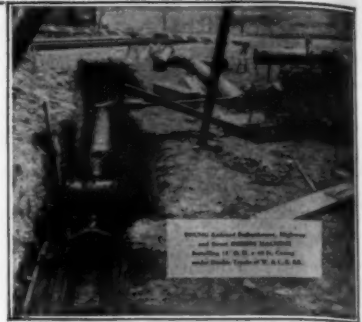
The machine is really a horizontal rotary drill, using the pipe which is to be installed as the medium for carrying the rotating cutter head. The machine is placed in the ditch and the gasoline

power unit is set up on the bank at the side. Power is transmitted by a counter shaft adjustable for height, carrying a sprocket with chain drive to the worm shaft on the boring machine.

This machine is suitable for installing casings up to 36" diameter. As the road bed or embankment is not disturbed, no back filling is required.

Machines are sold outright or furnished on a rental basis. Send for Bulletin No. 15-E.

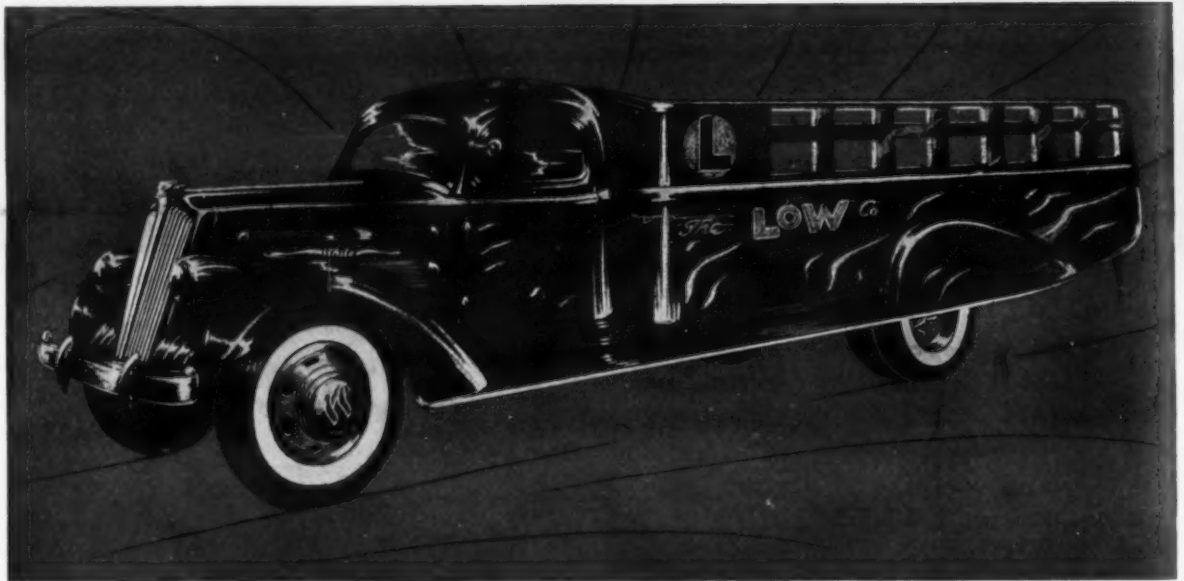
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They're ready now—the finest trucks that ever bore the White name—White's answer to the crying need for a quality truck, designed for today's operating conditions, and priced within reach of all.

During the past few years many operators were forced to turn to cheaper, lighter trucks. As soon as they were taxed beyond the definite limitations for which they were built they became too costly to maintain and operate.

The new Whites are real quality trucks—all White quality and engineering—from the manufacturer which operators know has the experience, the facilities and the skilled man-power to build quality.

The first completely streamlined trucks in America. Model illustrated was styled by Alexis de Sakhnoffsky, leading industrial stylist. All models are available with conventional body types for every purpose.

Throughout the entire specifications White has provided the type of ample truck ability that will show the owner lower operating costs. Feature after feature is patented and exclusive with White—bringing performance possible in no other truck. Four wheel booster operated hydraulic brakes; the first automatic air conditioned cab, etc., give operators the greatest truck value on the market today.

See the new Whites at your nearest White Factory Branch or Dealer or telephone for a demonstration. Liberal terms can be arranged. The Model 703 is priced at \$1240, chassis at factory.

Model 703 . 1-1 1/2 Tons	Model 704 . 1 1/2-2 Tons
Model 704A . 2-3 Tons	Model 709 . 2 1/2-3 Tons
Model 709A . 3-4 Tons	

THE WHITE MOTOR COMPANY • CLEVELAND

NO SHUTDOWNS with a HOBART

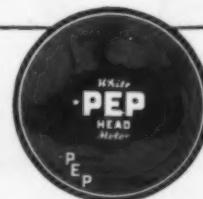
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No longer need broken equipment hold up your jobs—the Hobart 40-Volt Welder will let you handle repairs in short order—it is big enough to handle your steel construction work. Ask for your copy of "The Many Profitable Uses of Simplified Arc Welding." No obligation.

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WRITE TODAY for FREE BOOKLET

THE MOST ECONOMICAL TRUCK ENGINE EVER BUILT. The new White-built and White-designed 270 cu. in., 80 H. P. engine is the most durable, economical truck engine built. It has a newly designed combustion chamber exclusive with White—four port intake manifold—White patented stellite screwed-



in valve seats—seven bearing counter-weighted crankshaft—unusually large high-precision steel backed engine bearings—positive lubrication under pressure, to all moving parts. The efficiency of this power plant is a big factor in making these new Whites the outstanding truck values today.

Field Maintenance by Arc Welding

**Well-Equipped Repair Shop
and Trained Welder on Job
Save Contractor's Time and
Money**

CONTRACTORS' equipment is subject to the severest kind of service. Constantly exposed to all sorts of destructive elements—shock, abrasion, corrosion, etc.—earth moving machinery may soon become broken, worn and rusted. In coping with these destructive agents, the contractor is required to spend huge amounts of money on repairs. His profits are limited largely by what it costs him to keep his equipment in effective operating condition. To keep maintenance costs down to a minimum, the contractor must employ the most economical method of making repairs. This system must not only be economical in application but must be capable of being moved readily to the job.

Contractors have been quick to take advantage of the savings offered by arc welding in maintenance work. This process fuses new material directly to broken, worn or rusted equipment more quickly than any other process and makes lasting repairs at a fraction of the cost of replacement. Moreover, arc welding permits the making of many repairs without dismantling the equipment. Thus the possibility of the equipment being idle for days or weeks is eliminated.

Valuable Time Saved

Valuable working time is also saved because, with arc welding, the repair shop is moved readily to the job. With modern gas-engine-driven welding machines, arc welding can be used anywhere that gasoline is available.

The great versatility of arc welding makes it indispensable in the contractor's repair kit. Advantages are not limited to making great savings in repair work. New special equipment such as peculiarly shaped hoppers, truck bodies, concrete forms, chutes, bins, tool boxes, structural work and many other items can be built quickly and cheaply by the electric arc.

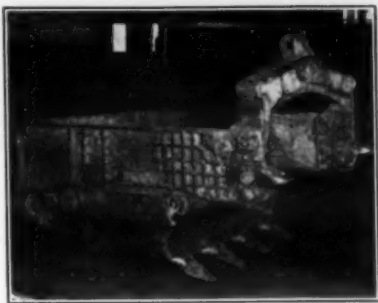
The contractor who uses arc welding, particularly shielded arc welding, obtains results which in regard to strength, ductility, resistance to corrosion, impact and fatigue, are equal to or better than the steel with which the equipment was originally built. This applies both to repair of broken equipment and resurfacing of worn parts.

One contractor, who regularly uses arc welding in repair work, recently reported saving \$550 in the repair of a dipper front, \$85 on steam shovel traction gear teeth, and \$30 on a tractor sprocket in less than a month. Similar savings are made regularly.

The Contractor's Repair Shop
The above typical example indicates



A 2½-Cubic Yard Dragline Bucket Badly In Need of Repairs



The Dragline Bucket Repaired by Welding

how the electric arc is the contractor's best all-purpose maintenance tool. Contractors who have experienced such savings maintain a regular welding repair shop efficiently manned and adequately equipped.

The equipment consists of one or two of the newest gasoline-engine-driven welding machines, fitted with an idling device which saves fuel by slowing down the engine when the arc is broken

and a remote control attachment which permits regulating welding current at the work without use of extra cables or accessories. These latest 40-volt machines, in addition to saving fuel and current, have 60 per cent higher capacity than older models.

In addition to experienced operators and efficient and adequate welding generating equipment, the contractor's welding repair shop maintains a complete assortment of welding electrodes. This is essential in order that any metal can be welded. The complete electrode kit contains electrodes for welding mild steel, manganese steel, light gage steel, stainless steel, high tensile steel, cast iron and aluminum; also electrodes for refacing equipment to resist moderate and severe abrasion.

It is only by having a properly manned and adequately equipped welding shop that the contractor can reduce his maintenance costs to the minimum. His possibilities for savings are limited only by the extent to which he uses arc welding.

The material for this article and the illustrations were furnished by the Lincoln Electric Co., of Cleveland, Ohio.

The Road Show to be held in conjunction with the A. R. B. A. Convention in Cleveland on January 20-24 promises to be the most successful ever held.

Don't miss it!

PERFORMANCE-ACCESSIBILITY



MARLOW PUMPS
Ridgewood, N. J.

IT'S A "BULLDOZER"

IT PUSHES FROM
THE REAR INSTEAD
OF PULLING FROM
THE FRONT!

IT OFFERS THE
FIRST MAJOR
IMPROVEMENT
IN GRADER DESIGN



LOOK AT THIS ONE BEFORE YOU BUY A GRADER!

By all means investigate the Huber "Superior" motor grader before placing an order. This great new grader offers the first major improvement ever made in Motor Grader design. It is radically different. It pushes the blade, like a "bulldozer," from the rear axle with astonishing results. Power, stamina, economy and long life are outstanding features. Its low first cost is another thing in its favor. Look at Huber "Superior" first. It has a wider range of road speeds and blade positions and does more and better work. SEND FOR BULLETIN NO. 400. Note: Good territories for responsible dealers still open.

THE HUBER MANUFACTURING CO.

MARION, OHIO

HUBER "SUPERIOR" MOTOR GRADER

PHOTOS AT RIGHT

An example of Huber Grader flexibility. ONCE over, this Huber "Superior" grader cuts a flat bottom ditch 4 ft. wide, 10 in. deep, necessary in the process of widening roads. An ordinary grader would require TWICE over to handle this operation with additional hand shoveling to remove ridge in bottom of ditch.



Method of Payment Secures Good Roads

Control of Measurement and Pay for Paving by Georgia Highway Dept. Gives Better Results

By F. M. GARNETT
Division Office Engineer
State Highway Board of Georgia

GEORGIA'S method of measurement and payment for limerock pavement is believed to be instrumental in securing a much better type of pavement than could ordinarily be obtained without proper control.

After the limerock paving has been completed, cores are bored to determine the thickness. These borings are taken at regular intervals of not more than 100 feet at various points on the cross section. The weighted average thickness of the base course is determined from the length of all the cores, and those cores in excess of $\frac{1}{2}$ -inch greater than the specified thickness are considered as the specified thickness plus $\frac{1}{2}$ inch. Should any section of the base be found by measurement of the cores to be $\frac{1}{2}$ inch or more under the specified thickness, the contractor is required to remedy the deficient thickness by scarifying to a depth of 4 inches and adding sufficient material to bring the depth to the required thickness, after which the entire area, including the surrounding surface, is rolled and watered until thoroughly bonded and compacted into a dense and unyielding mass with its surface true to grade and cross section.

Payment to Contractor

Should the weighted average thickness of the base course be less than the required thickness, the contractor is paid that proportional part of his unit bid price that the weighted average bears to the required thickness. Also if it is found that the weighted average thickness is more than the required thickness by $\frac{1}{4}$ -inch or less, the contractor is then paid an additional amount of that proportional part of his unit bid price that the weighted average thickness bears to the required thickness.

If the weighted average thickness is in excess of $\frac{1}{4}$ -inch greater than the specified thickness, the weighted average thickness is then considered as the specified thickness plus $\frac{1}{4}$ -inch and the contractor is only allowed payment for $\frac{1}{4}$ -inch excess thickness. For example, assuming that the weighted average thickness is 8.26787 inches, the contractor would receive payment for only 8.25 inches, as any thickness in excess of this average is deleted from consideration.

By this method of control of measurement and payment, very satisfactory results have been obtained.

New Two-Wheel Derrick For Material Handling

The new LeTourneau two-wheel derrick, just announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., was designed for use on construction jobs and in material yards, for loading and unloading heavy equipment, laying pipe and culvert, placing poles and heavy timbers, lifting and moving heavy materials and similar work.

This derrick is simple in construction, consisting of but three main parts, the boom, tongue and wheels. The boom comes in three lengths, 20, 30 and 40 feet. The derrick is operated by means of a LeTourneau 2-drum power unit mounted at the rear of a



The LeTourneau Two-Wheel Derrick Lifting the Body of a Large Dirt-Moving Buggy

tractor. One drum of the power unit supplies the hoist line; the other, the boom. The line speed of the lift varies from 65 to 400 feet per minute, depending on the rigging.

The capacities of these derricks depend on the size of the tractor with which they are used. The 20-foot boom derrick operated by a 75-hp tractor will easily lift $12\frac{1}{2}$ tons and carry $7\frac{1}{2}$. A 35-hp tractor and derrick will lift $7\frac{1}{2}$ and carry 5 tons.

Fills Settled by Dynamite for First Time in N. C.

The problem of settling the fills on bridge approaches was quickly solved by the use of dynamite for the first time in North Carolina on Gregory-Chandler's contract for a fill and bridge on North Carolina Route 24 about 12 miles west of Morehead City, according to a report of the work in *The Road Machinery News*.

Formerly, Broad Creek was bridged by a narrow 800-foot structure, which is now being replaced by an 80-foot bridge and fills on either end to complete the distance. When the fill was first begun, the weight of the sand fill forced the mud and muck, characteristic of creek beds on the coast, to rise 2 to 4 feet on either toe of the fill. After the first layer of fill had been completed, the dynamite was loaded into a series of holes and detonated. However, this explosion was not great enough.

On the second charge, the amount of

dynamite was increased in the holes which were 10 feet apart in rows long way of the fill, and a total more than a ton of dynamite was used. After this charge was set off, the fills settled from 4 to 5 feet.

A special representative of the powder company cooperated with the highway construction engineers and the general superintendent for the contract.

MECHANICAL MARKING MACHINE

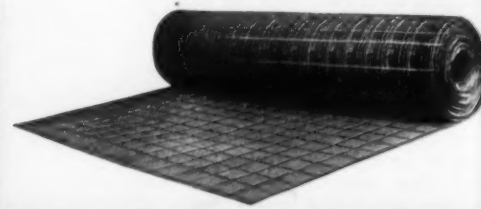
for STREETS, HIGHWAYS, TENNIS COURTS, FACTORY FLOORS, etc. Will produce a clean cut line, 3 to 6 inches in width, with total cost less than .005¢ per foot. Easily handled and controlled to meet the ordinary or the special marking conditions. Write for Booklet G illustrating our line of paint spray equipment. SIMONS PAINT SPRAY BRUSH CO. Dayton, Ohio



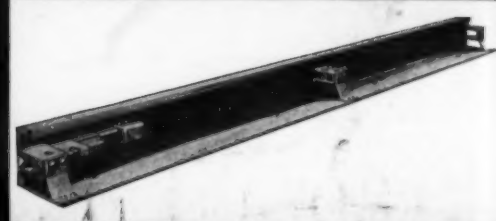
THE THREE RULES OF TRUSCONOMY are your best guide in Modern Road Construction

- ① Build for Permanence
- ② Build for Safety
- ③ Build Economically

You observe them all when you use TRUSCON STEEL HIGHWAY PRODUCTS



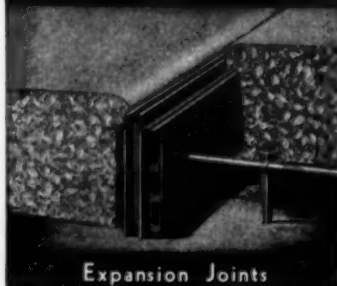
WELDED STEEL FABRIC



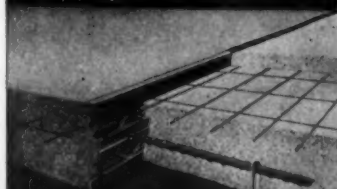
ROAD FORMS



CURB BARS



Expansion Joints



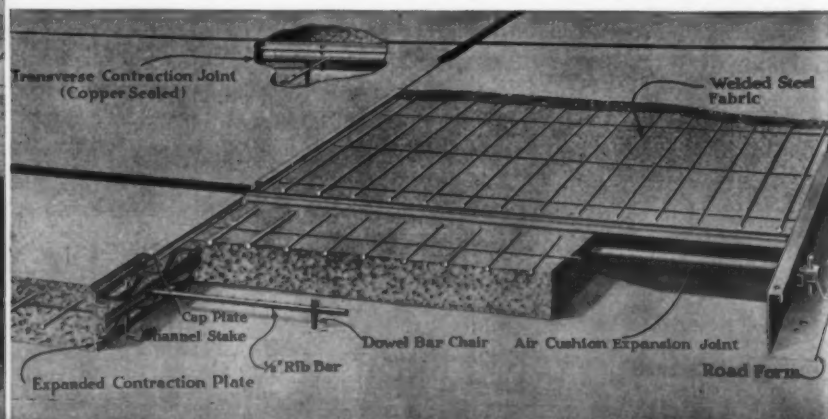
Contraction Plates



Trusguard

To obtain the three essentials of Trusconomy the products used to reinforce the modern concrete road must be functional—products that have been designed to meet a specific requirement and fulfill that requirement efficiently. For over thirty years Truscon's Products have been designed and constantly improved to give road builders the utmost in efficient products that make possible Permanence, Safety and Economy in modern concrete road construction.

Truscon's line includes: Welded Steel Fabric for reinforcing; Road Forms for durability and economy; Expansion Joints and Contraction Plates to relieve stresses in concrete bases; Rolled Steel Bars for supplemental reinforcing; Curb Bars and Edge Protectors; Guard Rails for highway protection and safety.



TRUSCON

STEEL COMPANY
YOUNGSTOWN, OHIO

Well-Lighted Highways Promote Safer Driving

Better illumination of highways, besides facilitating night-time traffic, will eventually bring the day when the number of accidents resulting from blinding headlights will be minimized. In less than two years, vapor illuminants, notably the sodium vapor and the high intensity mercury vapor lamps, have passed from the experimental stage into the class of practical, efficient sources of artificial light. Operating efficiencies

which are extremely high as compared to other artificial illuminants, are, of course, the chief advantages of the vapor illuminant and have alone justified the cost and effort in early research and development engineering to determine the practical possibilities of this phenomenon that produces light by sending an electrical charge through a metallic vapor, according to Oscar P. Cleaver, Illuminating Engineer of the Westinghouse Lamp Co. in a paper presented before the Illuminating Engineering Society in Cincinnati, Ohio.

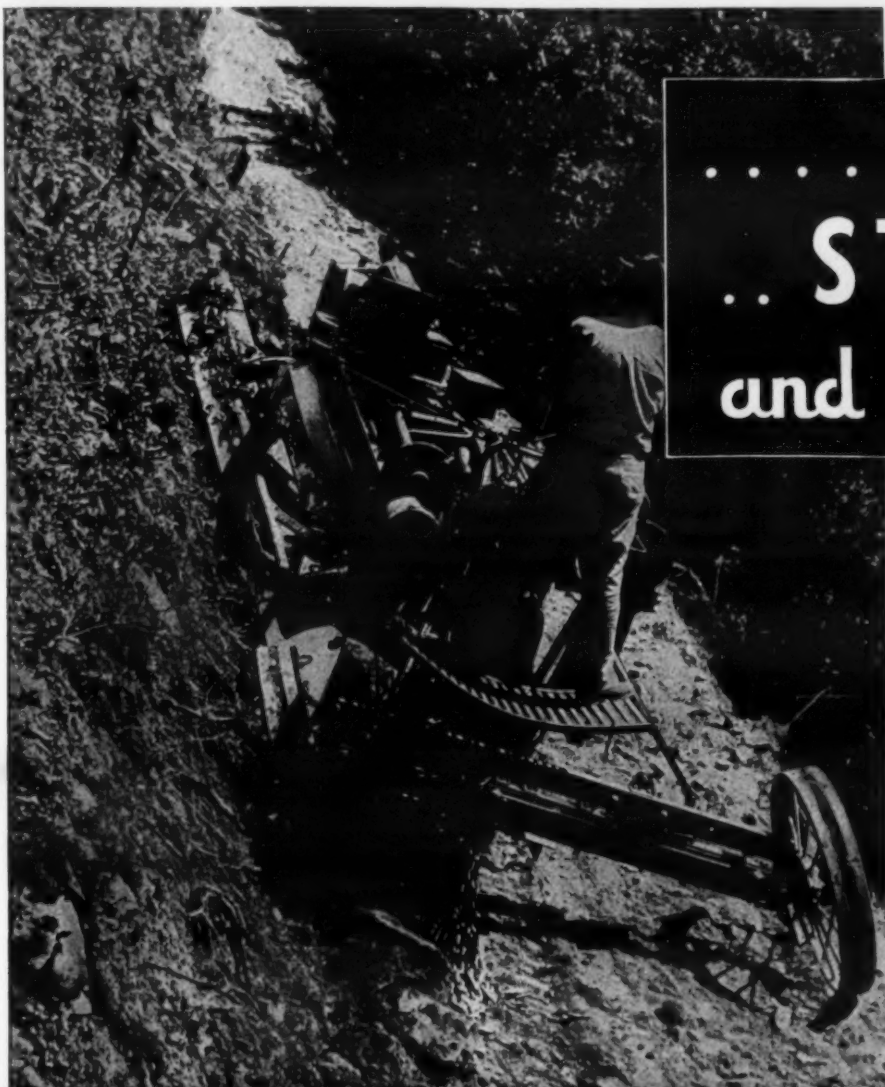
Although state and county authorities find it difficult to obtain funds with

which to install modern highway lighting, such as the sodium vapor lamp offers, those few now in operation are expected to show that savings in lives, property damage, and taxes will more than pay for the original outlay. Almost every instance in which accident statistics are gathered, night-time injuries and fatalities are on the order of twice those which occur in the daytime. Blinding headlights and the laxity of drivers in replacing burned out lamps only aggravates the general carelessness and recklessness of those drivers responsible for the majority of accidents.

While it seems improbable that civi-

lization can ever govern the driving proclivities of American motorists, said Mr. Cleaver, effective highway illumination can certainly give us a condition in which accident tendencies can be reduced immeasurably. The sodium vapor light is nearly a monochromatic yellow and falls close to the point in the light spectrum where the human eye is most sensitive to vision. Hence its use on highways permits quicker and sharper vision for motorists, enabling them to see 2,000 feet or more ahead without the need of their driving beams.

Information on sodium vapor lights may be secured from Westinghouse.



..... Amazing STRENGTH and RIGIDITY

THE new box-type frame in Adams Graders has tremendous strength and rigidity to hold the blade firmly to the cut and withstand hard usage. It is a solid, one-piece all-welded unit—no rivets to work loose—nothing to give trouble.

Other outstanding features of these machines are an extremely wide range of blade working positions, quick and easy manipulation, and extraordinary visibility. New mechanical features contribute to ease of operation and long life.

Available in 12 ft. and 10 ft. blade sizes with hand or power-operated controls. Don't buy any grader until you investigate these remarkable machines.



J. D. ADAMS COMPANY, Indianapolis, Indiana
Branches, Representatives and Distributors
Throughout the United States

—The New-Type ADAMS GRADERS



U.S. Forest Service machines building roads through the forests and mountains of Pennsylvania—part of an order for 217 such graders recently delivered to this department.

Fast Dirt Moving by Elevating Grader

J. J. Thompson Moved 50,000 Yards in 25 Days on 5.3 Mile Road Job West of Comanche, Okla.

(Photo on page 40)

IN preparation for a mixed-in-place surfacing of a 5.3-mile contract on U.S. 70 west of Comanche, Okla., Ryan & Richards of Oklahoma City, Okla., hired the grading outfit of J. J. Thompson, also of Oklahoma City, to speed up the completion of the grade. The finished job is a 6-inch gravel base with a 1½-inch cold rolled mixed-in-place top.

Although working under the 30-hour-a-week NRA regulation the contractor could operate his crew only 8 hours a day, according to Oklahoma law. With the machines and the wagons working in perfect unison on the 200 to 800-foot hauls it was not necessary to extend the time of operation of the machines with new operators.

A Caterpillar Sixty power-operated elevating grader with a 42-inch belt pulled by a Caterpillar 75 diesel tractor fed the waiting line of 10 wagons with 3-mule hitches continuously and moved 2,000 yards of dirt regularly in the 8-hour shift.

It is particularly interesting to note that the fuel cost for the Caterpillar Thirty gasoline engine on the elevating grader for operating the belt was \$2.60 per 8-hour day while the fuel cost was \$1.10 for the big Seventy-Five tractor.

The grading outfit was in charge of A. W. Palleson as Superintendent and J. R. Keeth was Resident Engineer for the State Highway Department. Only white labor was used on the job.

New Equipment Dealers Represent C. H. & E. Mfg. Co.

The C. H. & E. Mfg. Co., Milwaukee, Wis., has announced the appointment of the following companies as exclusive distributors of C. H. & E. saw rigs, pumps, hoists and mortar mixers: The Albany Construction Equipment Co., 137 So. Allen St., Albany, N. Y., for northeastern New York State; Brown & Sites Co., 30 Church St., New York City for the Metropolitan New York area and the State of Connecticut; The Paving Supply & Equipment Co., 10th & Girard Sts., N. E., Washington, D. C., for the District of Columbia and eastern Maryland; and H. B. Fuller Equipment Co., 1836 Euclid Ave., Cleveland, Ohio, for northeastern Ohio.



C. & E. M. Photo
The Elevating Grader Takes a Bite

Minnesota Plans Program to Provide Winter Work

A substantial program of winter construction will be carried out by the Minnesota Highway Department as a result of the changes made in regulations governing Federal Works program road and grade separation funds, according to an announcement by N. W. Elsberg, State Highway Commissioner.

Several important restrictions have been removed from the state's \$5,395,000 allotment for railway grade crossing elimination, Mr. Elsberg said. Regulations governing the \$5,277,000 allotment for highway work have also been modified. As a result, work can be started on both programs within a short time and employment will be provided in many localities throughout most of the winter.

"As a result of the changes in Federal regulations we can now carry out a

grade crossing elimination program practically on a normal basis," Mr. Elsberg said. "Federal funds can now be used for the purchase of sufficient materials and the use of sufficient equipment to build modern, permanent grade separation structures. The requirement that 90 per cent of the labor come from relief rolls also has been removed although men on relief will continue to receive preference."

Figuring the average cost of grade separations at \$50,000 each, highway engineers said that the State's allotment should make possible the elimination of about 100 railway crossings. Much of this work can be done during the winter.

The labor requirements on works program highway funds also have been modified, although the limitation of \$1,400 of Federal funds per man-year of employment has been retained. On this basis, the Highway Department will provide about 4,500,000 man-hours of employment with the \$5,277,000 highway fund, in addition to paying for materials and equipment.

10 months of 24-hr. operation



Lyons, France—XAHU 25 hp. Waukesha-Hesselman Engine driving Ingersoll-Rand Portable Compressor which furnishes air for the Jackhammers. Cobet, Freres, Contractors.

*with engine up-keep
under 5 mills per hr.*

● On the new sky way road job in Shenandoah

National Park near Fort Royal, Va., five Ingersoll-Rand Portable Compressors like this, driven by 100 hp. WFH Waukesha-Hesselman Oil Engines, operated 24 hours a day for ten months furnishing air for operation of wagon drills. A total of 29,000 consecutive machine hours! Yet the bill for overhaul, maintenance and repair amounted to only \$210.50, including the compressor itself. Assuming that the engine maintenance was more than half the total, for this strenuous schedule, the cost is still under 5 mills per hour. ● For more than three years Ingersoll-Rand have been shipping these engines with their portable compressors to all parts of the world. And nowhere has it been found necessary to use experienced labor to operate them. A Hesselman is so simple in construction that anyone understanding gasoline engines can operate it. ● Write for Bulletin 1,000.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
WAUKESHA ENGINES

PILE HAMMERS
and
EXTRACTORS
HOISTS - DERRICKS
WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.

19 Park Row, New York
Distributors in Principal Cities

Twelve Good Rules for Tire Health

Follow This Guide and Truck Tires Will Give Service for Longer Periods

If YOU take care of your truck tires properly, if you observe the following dozen simple and not particularly troublesome rules, you will tremendously decrease the abuse which the average tire is subjected to and you will accordingly decrease your own chances of tire failure and possible accidents. By taking this set of precautions you will also reduce your tire bill anywhere from 25 to 50 per cent, depending upon how careful you are already. Instead of merely listing the twelve rules, we are including some of the comments made by K. D. Smith, Technical Superintendent, Tire Division, B. F. Goodrich Co.

Air Pressure

1. Maintain the recommended or rated air pressure at all times. The recommended pressure is the minimum below which the tire should never be allowed to fall, nor should pressure be maintained much above this figure. With dual equipment it is often advisable, particularly on highly crowned roads, to use 5 or 10 pounds higher pressure in the outside dual tire than on the inside. Truck tires often develop high temperatures, which cause a considerable increase in pressure. Since the inner tire has less opportunity to dissipate heat, it can be partially protected by placing the greater share of the load on the outside tire, and this may be done by increasing the air pressure in the outside dual. Pressure should always be checked at least once a day. If pressures have dropped appreciably, the valve should be checked. The high pressures sometimes developed must not be lowered en route, as this aggravates the condition and is identical to starting the trip with tires under-inflated. Of course, an old inner tube will lose air faster than one in good condition. If your inner tube is so old that it loses air at an excessive rate, it is good economy to get a new one rather than take a chance on breaking down the tire casing by continuing to use it under-inflated.

Check Pressure of New Tires

2. Whenever you put on a new tire, or whenever a tire has been taken off the rim, do not start off on a long haul in implicit faith that the air pressure is what it should be. For reasons too involved to explain here, a tire immediately after it is put on the rim and run may lose several pounds of pressure. Likewise, a new tire is likely to lose air more rapidly for its first few

weeks than after it is broken into service.

Shift Tires Around

3. Do not run a tire constantly on the same wheel. Shift your tires from wheel to wheel, which will produce even wear. Include your spare in this scheme. Never allow a spare tire to remain unused more than six months, because it deteriorates rapidly if left unused too long. The way to use a tire most economically is to run it in every position on the car. On trucks with dual rears, new tires should be placed on front wheels where tire failures are most liable to cause loss of control of the truck. When partially worn, it is good practice to shift to the outside rear dual and then to the inside rear. Except in certain cases, the best service can be obtained if the inner tire shows slightly more wear than the outer one.

New Safe Tires on Rear

4. Do not rely upon the generally accepted belief that it is all right to run old tires on the back wheels, because a

rear tire blowout is supposedly less dangerous than one in front. Tests show that a rear tire blowout is every bit as dangerous as a front tire blowout, ex-

cept with duals. In this case, however, it is not wise to place too much faith in one tire holding you on the road. If

(Continued on page 20)

JAEGER Adjustable SPREADER



SMOOTHLY SPREADS STONE, MACADAM AND BITUMINOUS—1" TO 10" OF LOOSE MATERIAL, 8 TO 11 FT. WIDTHS.

Lays low cost roads, faster, smoother and with real savings.

JAEGER BITUMINOUS PAVER power-driven, adjustable 9 to 15 ft., does precision job without forms. Write for details.

The Jaeger Machine Co. 701 Dublin Ave., Columbus, Ohio

THEY'RE PARTIAL TO SHOW-DOWN ECONOMY CATERPILLAR

Nine out of ten tractors at work on the biggest construction projects in the United States are "Caterpillars." Over half of these are "Caterpillar" Diesels and the figures are shifting in favor of the Diesel model every day. . . . The contractors say it's economy, above all else, that puts the "Caterpillar" Diesel in their equipment. And the "Caterpillar" SHOW-DOWN proves it! Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

REG. U. S. PAT. OFF.

D I E S E L



The "Caterpillar" Diesel Seventy-five Tractor and "Caterpillar" Grader—an unbeatable team for road construction at lowest possible cost. Here it is banking a grade on a highway near Joplin, Mo.

SAUERMAN LONG RANGE MACHINES



for Digging in the Dry or Under Water

Reach as far as 1500 ft.

Dig Deep; Dump High.

Capacities from 100 to 5,000 cu. yd. a day.

Low in Cost

Write for Catalog.

SAUERMAN BROS., Inc. 464 S. Clinton St. CHICAGO . . .





The Galion Junior Patrol Grader

New Light Motor Grader

The Galion Junior Patrol motor grader, recently announced by the Galion Iron Works & Mfg. Co., Galion, Ohio, is a new, light, inexpensive grader for use in maintenance work. It has full hydraulic operation for raising and lowering the blade and scarifier. Only a slight pressure forward or backward on the three short range levers makes all adjustments instantly and accurately. In addition to providing easy operation, the hydraulic control reduces the number of parts and provides that all working parts are lubricated by the oil in the hydraulic system.

The frame is amply braced and reinforced with torque tubes to eliminate weave, even under severe operating conditions. An 8-foot moldboard and blade is regular equipment but a 10-foot moldboard and blade may be substituted at additional cost.

Power is furnished by a McCormick-Deering I-12 industrial power unit developing 21 hp at 1,800 rpm. Three forward speeds are available, with throttle control. Only 6 to 8 gallons of gasoline per day are required to operate this grader.

New Name and Address for Tractor Dealer

The Quincy Tractor Co., formerly located in Quincy, Ill., has announced a change in name and location. Henceforth the company will be operated under the name of the Martin-Roasa Tractor & Equipment Co. and will be located at 600 D Avenue, Cedar Rapids, Iowa. This firm handles a complete line of Caterpillar tractors, road machinery and diesel engines.

MILES OF PROFITABLE DIGGING



USED TRENCHER with FACTORY GUARANTEE

It's a late model P&H Trencher... hardly more than "broken-in." Carries factory guarantee. Offered at an unusually low price that will make your ditching jobs more profitable. Has latest features for big production with 3-speed sliding gear transmission for bucket line and 3 speeds for high gear traction. Boom crowd is independent for increased flexibility; "sure feel" clutch, protects against disabling shocks. It's easier to operate—built to take punishment. If you have ditching jobs ahead, investigate this machine now. Write or wire for complete details on machine No. 173,000.

HARNISCHFGER CORPORATION
4419 W. National Ave., Milwaukee, Wis.

Trailers Do Double Duty In Toronto Service

Flexible transportation equipment is essential for a material company. Canada Building Materials, Ltd., Toronto, Ontario, combines two distinctly separate types of haul with its motor equipment in summer; bulk cement to Toronto from its cement plant at St. Mary's, 200 miles away; and then ready-mixed concrete to contractors in Toronto itself. The tractors do double duty on these hauls. Equipped with standard Fruehauf 5th wheels, they are interchangeable between the manual-type trailers on which Moto-Mix units, made by Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis., are mounted, and the full-automatic type used for the St. Mary's-Toronto trip.

The Fruehauf semi-trailers, made by the Fruehauf Trailer Co., Detroit, Mich., which are used in delivering concrete to contractors are equipped with rotary mixers driven by gasoline engines. The

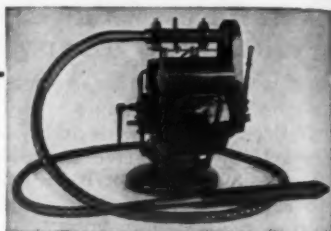
underbody hoist, usual on installations of this type, has been eliminated and instead a rotating worm gear inside the drum itself carries the concrete out to the unloading chute. These units have a capacity of 5 yards each and an overall length of only 26 feet 3 inches. By comparison, large 4-wheel drive and 6-wheel straight trucks used on this same job are carrying only 3-yard loads. Each mixer keeps four men busy shoveling concrete down a long trough.

Suggestions for Safety Stunts

A new Safe Practices pamphlet No. 100, entitled "Safety Stunts" has recently been issued by the National Safety Council, Inc., 20 No. Wacker Drive, Chicago, Ill. In addition to well-organized safety education activities, very often safety stunts, although their value may be temporary, attract attention and provide a vehicle through which the real educational activities can

be continued.

The many stunts which have been described and illustrated in various Council publications throughout the years have now been gathered together in this new pamphlet, copies of which may be secured from the Council.



Concrete VIBRATORS AND GRINDERS

Write for Circular on types, sizes and prices

White Mfg. Co.
ELKHART, INDIANA

Here's How Mr. Davidson Bought His Low-Priced Truck..

He says, "I'm saving from \$8 to \$10 a month on Gasoline alone by switching to..."



HERE'S WHAT HIS DODGE DEALER REPLIED...
"Sure... that's what we Dodge dealers are here for... I'll be right over with a 'Show-Down' Score Card so you can check all the low-priced trucks for yourself in your own office feature by feature."

HERE'S WHAT MR. DAVIDSON SAYS... "As soon as I learned that the Dodge engine has all those extra money-saving features, I figured a Dodge truck was bound to cost me less for gas and oil than either of the other two lowest-priced trucks. And I was right... I'm saving \$8 to \$10 a month on gasoline alone since switching to Dodge... not to mention the money that hydraulic brakes and all those other Dodge features save me on tires and upkeep."
(Signed) S. DAVIDSON
Chicago, Ill.

THESE ARE DODGE FEATURES THAT MAKE FOR GAS ECONOMY



EXHAUST VALVE SEAT INSERTS—save gas, also save money on valve grinding. SPRAY-COOLED EX-

HAUST VALVE SEATS—save on gas. FULL-LENGTH WATER JACKETS—save gas, prolong engine life. 4 PISTON RINGS INSTEAD OF 3—save oil, improve compression. ALUMINUM ALLOY PISTONS—lighter weight, save gas, reduce vibration. OIL COOLING—reduces oil temperatures 40 to 50 degrees, improves lubrication, saves oil.

DODGE!

HERE'S the way to be sure of getting the right truck for your job! Buy your next low-priced truck the same businesslike way that Mr. Davidson did! Do the buying yourself on value only. Just take the Dodge "Show-Down" Score Card and check all of America's low-priced trucks. Ask yourself, "What does this truck have? What features are built into it that will save me money?"

When you buy this way—strictly on what you get for your money, there is only one truck for you—Dodge. For example, only Dodge of America's 3 lowest-priced trucks gives you hydraulic brakes. Only the Dodge engine gives you the gas and oil saving combination of exhaust valve seat inserts, spray-

cooled exhaust valve seats, 4 piston rings instead of 3, full-length water jackets, and a factory-installed oil filter. Those are only the first few on Dodge's list of finer money-saving features.

You don't have to be an engineer to understand these Dodge finer features! You don't need to be an accountant to figure how much less money your Dodge truck will cost for gas, oil, repairs, tires and upkeep. Your Dodge dealer will be glad to give you a "Show-Down" Score Card free and without obligation. See him today!

DODGE DIVISION OF CHRYSLER CORPORATION

*List prices at factory, Detroit, subject to change without notice. Special equipment, including dual wheels on 1½-ton models, extra. Time payments to fit your budget. Ask for the official Chrysler Motors Commercial Credit Plan.



1½-TON CHASSIS AND CAB—6-cyl., 137" w. b.—with 18 high-priced, quality features. (Dump body and special equipment extra)..... **\$595***

Dependable **DODGE TRUCKS**

Building Lip Curb with New Machine

The Koski Construction Co., in building a section of concrete highway on Route 20 near Ashtabula, Ohio, used a Flex-Plane screeding machine for building the lip curb. The ends of the screed were formed so as to lift the exact amount of concrete necessary for the curb and place it at the edges. At the time of screeding there was some slump. Therefore, shortly behind the finishing machine, the material was roughly hoed against the forms about 1 to 2 inches higher than the actual finished curb. The remainder of the work was done by the curb building machine.

When passing over the concrete the first time, the forming device had a back and forward longitudinal motion, similar to the transverse motion on the finishing machine screed. On the next pass, the longitudinal stroke of the

forming device was omitted and the device acted as a trowel while the machine moved forward, leaving a uniform finish.

The forming device is so arranged that it can be raised or lowered and any amount of pressure exerted against the material within the limits of the



The Flex-Plane Machine for Building Lip Curb

weight of the machine. At first the curb was vibrated but as this caused additional slump, it was omitted after the first day.

The contractor estimates the machine has done the work of four to five men in a more uniform manner and with a greater compaction of material. The concrete used had a slump of approximately 1/2-inch. The equipment was furnished by the Flexible Road Joint Machine Co., Warren, Ohio.

New Type of Sump Pump

A compact, rugged sump pump unit, constructed of non-corrosive materials to insure long life, has recently been announced by the Mall Tool Co., 7740 So. Chicago Ave., Chicago, Ill. This unit which is light in weight, and is easily carried by one man, requires no air compressor or expensive auxiliary equipment to operate it.

Because the pump itself is submerged directly into the water being pumped,



The Mall Sump Pump Unit

the pump is self-priming, and is also non-clogging. It discharges 4,500 gallons per hour against a 25-foot head and its 2-inch discharge opening can be fitted with either hose or pipe.

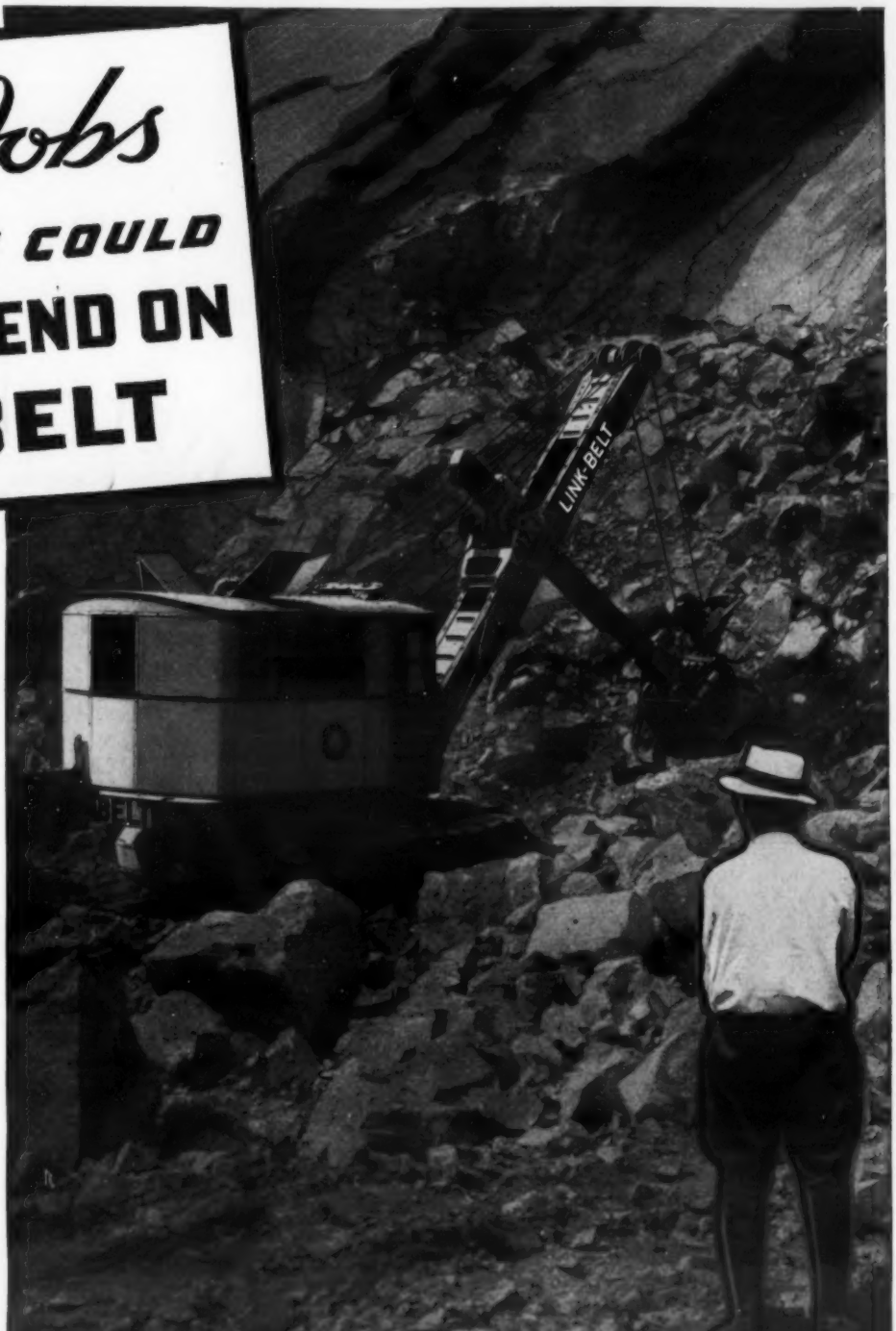
This pump can be operated from any Mall gasoline engine or electric set with vibrator shaft detail by simply coupling the flexible shaft furnished with the pump to the flexible shaft used for vibrating.

Tough Jobs
**TAUGHT HIM HE COULD
ALWAYS DEPEND ON
A LINK-BELT**

Your estimate of a man or machine grows to admiration when wearing qualities stand up against tough going. That's the beauty of a Link-Belt. It never lets you down on any job. Its ability to give faithful service under all working conditions commands the fullest respect from exacting engineers. See the job through with a Link-Belt.

From 3/4 to 3 yds. capacity, heavy-duty built. Gas engine, Diesel, or electric motor drive. All models can be shipped loaded on a flat car without dismantling.

LINK-BELT COMPANY
300 W. Pershing Road, CHICAGO
Offices and Distributors in All Principal Cities



STABILITY-POWER-SPEED

LINK-BELT

SHOVEL-CRANE-DRAGLINE

How the Other Fellow Did It

Ideas Which Have Already Proved Helpful to Contractors

Keeping Center Steel in Place

368 The use of steel wire chairs is the common way of keeping center steel at the proper elevation and position in the slab on most jobs. In Colorado County, Texas, H. B. Zachry, contractor of Laredo, Texas, used a different method because of the soft sub-grade which was water treated to permit rolling the "buckshot" gumbo to a firm sub-base. This contractor used the standard "dachshund" type of support with the 4 feet slightly spread to give greater bearing area on the soft grade.



C. & E. M. Photo
The "Dachshund" Supporting Center Steel

The illustration shows the supporting unit with the levers which released the steel when the concrete was placed around the rods holding them at the proper, and permanent elevation, on work underway on NRS 779, Highway 71, an 18-foot, 9-6-9-inch concrete pavement 9 miles long.

Floodlight on Truck Chassis

369 Visiting some work of the Yant Construction Co. of Omaha, Nebr. on U.S. 30-S about 20 miles west of Omaha, where some interesting widening was under way, we saw a novel floodlight that has proved of great help in finishing the concrete when the paver has worked late and dusk arrived before the finishers were through with their all-important work.

A Kohler 1,500-watt electric plant was mounted on a shortened chassis with solid tired wheels. The floodlight was mounted on a pole about 8 feet long inside a pipe and so rigged that a hand winch at the base of the pipe could raise the floodlight another 7 feet and thus cover a much larger area. A slot in the outer pipe acted as guide for a lug welded to the inner pole. The cable from the winch was run through a sheave at the top of the outer pipe and then down to the lug.

The rig, which was in reality a trailer, could be easily moved around for short distances by one man and when



C. & E. M. Photo
The Lighting Unit Used by Yant Construction Co.

ready to be moved over the road could be towed behind any truck or automobile.

Which Way Do Stations Run?

117 + 00

370 How many times on a job have you had to look first one way and then the other to answer a question about the station where the work was at that particular moment? C. R. Haile, County Engineer of Harris County, Texas, has this question answered by the simple expedient of having one end of the stakes carrying the station number pointed and the pointed end always shows the way to the next higher station. Thus you always know at a glance where you are at between stations.



4 SIGNAL STANDARDS
30 STOCK SIGNS

Write for new bulletin telling about this handy

MARTINDALE SAFETY ROAD SIGN

Opens — closes — with one hand. Flag by day; flare lantern at night. Folds to tool box. Any sign quickly snapped on. Time saved so pays the cost.

MARTINDALE ELECTRIC CO.
1387 Hird Ave.
CLEVELAND, OH

WATCH a modern Bucyrus-Erie dig . . . notice the sureness with which the dipper holds the grade, the freedom with which it is safely dropped into the pit, the swift throw through the bank, the invariable heaped load, the quick acceleration of the swing, the sharp stop over the truck and the quick dump. You can get speed like that without accurate, effortful control . . . and Bucyrus-Eries have it to a superlative degree.

control



BUCYRUS
ERIE

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

Handling Snow Problem in State of Ohio

(Continued from page 8)

is used per cubic yard of material, depending upon the location. In the north portion of Ohio, stockpiles of abrasives are almost invariably treated and the higher percentage of chloride used.

The Snow Plows

The next step is equipping trucks with snow plows. In the heavy snowfall area distribution of plows is approximately one for each 20 to 25 miles of state highway, and in the light snowfall area one plow is allotted to each 50 miles of road. This distribution of equipment is accomplished with whatever equipment available. It has not been possible to make an ideal allotment of equipment, because we are overbalanced with heavier, slow moving plows. When more of this heavier, slow moving equipment is replaced with the lighter, speedy equipment, more efficiency will be obtained.

Proper, safe, and a uniform system of illumination for each plow truck is desirable and is gradually being developed. The accidents involving snow equipment are truly alarming, and the cost of settling claims, if eliminated, would more than offset the cost of a very elaborate system of effective illumination. It has been found that illumination for the operator alone is inadequate and we are striving to attain a type of lighting which not only shows the driver the road, but also shows the motorist the character of the equipment and defines the width of the plow.

Each plowing unit is equipped with tow chains, tire chains, extra red lanterns, shovels, and a reserve supply of gasoline before it starts out plowing.

Snow Fence

Snow fence is used in the conventional manner, erected from 75 to 150 feet from the road. This is installed in the fall before we anticipate our first snow. In this state there is approximately 567,000 feet of snow fence used along the state highways, in the north and northeast portion of the state where the heaviest snows occur, and where the topography of the country makes the roads subject to snow drifts.

Abrasive Spreaders

Another very necessary step in preparation is to get the right distribution of abrasive spreaders. The spreaders used in Ohio are the conventional types of aggregate spreaders and are assigned according to the amount of work to be done. The distribution works out to be



A Well-Plowed Ohio Highway

about one spreader for each 12 miles of road which is to receive continuous treatment with abrasives. A point which often has been overlooked, but one to which we are paying more and more attention, is to be sure that each truck to be used with a spreader is properly equipped with a hitch for that spreader.

This may seem like a perfectly obvious thing, but is often neglected. Furthermore, the spreader must be allocated to the section where the abrasive for which that type of spreader is adapted is to be used. The cinder spreader is very often useless with wet sand. Obviously, place the cinder spreader where cinders are going to be used and the sand spreader where sand is to be used. This is another important point, sometimes neglected.

Orders and Action

In order to get some uniformity in the snow plowing and icy pavement treatment, orders of priority of work are worked out at the state highway headquarters for all principal roads. Division headquarters work out the order of priority for the roads of lesser importance. In this way a route that is plowed promptly in one division is not apt to be overlooked in another. It is our aim to treat icy pavements continuously on about 2,000 miles of the 12,000 miles on the state system and

treat selectively the balance of the mileage, such treatment being confined to hills, bad curves, intersections, grade

(Continued on page 33)

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks, Highway pavement and Concrete products.

Write for circulars and engineering data.

MUNSELL CONCRETE VIBRATORS

997 West Side Ave. Jersey City, N. J.

THE TRUCK FEATURE OF THE YEAR!



GMC Dual Performance Saves Gas, Oil, Time and Wear!

"One of the few major truck improvements of the past ten years," says one operator! "In our operations dual performance works out to perfection," says another! And from still another user: "Does more work with less gas".

Think of saving as much as 28% on gas. Think how much lower upkeep expenses will be because of reduced wear and tear on engine and other driving units. And in addition to these important savings, the GMC Dual Performance axle assures more effective use of power—the truck will climb a steeper grade, travel faster on the level and handle full loads

easier. Too, Dual Performance gives better pick-up in traffic, which in combination with greater speed and power, reduces running time, enabling the truck to do more work per day.

Get all the facts about GMC Dual Performance—available in the 1½-2 ton and 2-3 ton ranges. Learn, too, the many other reasons why profit-minded operators are swinging to the many-feature GMC trucks of value. Whatever your hauling needs may be, there's a correctly engineered GMC truck or truck-with-trailer to fit exactly. Capacities range from 1½ to 22 tons.

Time Payments Available Through Our Own Y. M. A. C.

GENERAL MOTORS TRUCK CO., PONTIAC, MICH.

GENERAL MOTORS TRUCKS and TRAILERS

1½-22 TONS

THE TRUCK



OF VALUE



AIR COMPRESSOR from FORD PARTS

With the patented Smith Compressor Head you can now build your own Motor-Compressor with 60-cubic feet capacity. Head is furnished with high-speed compressor valve over two cylinders, unlenders and complete instructions for mounting on your Model A or B Ford Motor. These Motor-Compressors are now being used in over twenty states for drilling rock, breaking pavement, riveting, sand blasting, painting, etc.

Write for full information and prices.

GORDON SMITH & COMPANY

1228 State St. Bowling Green, Ky.

Twelve Good Rules for Tire Health

(Continued from page 15)

the mate to one of these duals fails, the overload thrown on the other often causes it to fail simultaneously. On single rear equipment, if the pavement happens to be slippery when the tire blows, and the remaining back tire is worn down so that it has no anti-skid tread on it, a rear tire blowout is more dangerous than a front blowout, because the rear end is the end of the vehicle which does most of the skidding.

Speed Cuts Mileage

5. Unless you drive a hook-and-ladder or an ambulance or a squad car, don't go around corners at high speeds. It wears the tires faster than almost anything else. When you twist your steering wheel at high speed, the tires turn, but the rest of the car tries to obey the law of inertia; it keeps on going in the same direction as before until the tires drag it into the path indicated by the front wheels. This puts a terrific strain on the sidewalls of the tire. Likewise the whole tire probably slides an inch or two sidewise on the pavement.

Don't Slam on Your Brakes

6. Except to prevent an accident, do not slam on your brakes. Not to mention what this practice does to brake linings, brake drums, and other parts of the car, it is not good for the tires. They have to stop going around, but inertia compels the car to keep going until the tires stop it. If the car or truck is moving fast enough, there is a forward slide that probably grinds an appreciable quantity of rubber off the four tires. Besides, it gives each tire a jerk along the lower side, which may damage the rubber and the carcass and the joint between them. Brake as gradually as possible, the slower the better for the tires.

Alignment Important

7. Have the wheel alignment checked occasionally, the rear wheels as well as the front. To have this done properly, take the car or truck to a competent wheel alignment man who has the equipment to measure and make these adjustments. Front wheel alignment involves definite and proper angles in three different planes, so it is not something that can be done by guess. If the car or truck is old, and the test shows worn parts, which permit the wheels to wobble, have them repaired even if it takes a new bearing, or new king-pins and bushings. In addition to the possibility that a wobbly wheel may come off, it is very hard on tires.

Remove Pebbles From Treads

8. Look over the tires occasionally to see how they are getting along. Those small pebbles lodged between the anti-skid corrugations will probably fall out while you are driving, but occasionally one may stubbornly remain there and work into the tread far enough to bruise and break the cords—which will probably lead to a blowout and a vulcanizing job. It is safer to pry out these little stones with a screw driver. Examine the tread for nails and tacks. Pull them out if you have any, as you probably have. If your inspection of the tires discloses any blisters or cuts, have a competent tire man look at them. Some of them are unimportant, others can be cured by a very inexpensive vulcanizing operation before they spread, others are genuinely dangerous and may blow out at the wrong moment. Be sure to remove any stones or other objects that may have become lodged between the rear dual tires.

Heat Causes Blowouts

9. High speed generates heat inside tires. Rubber above a given tempera-

ture deteriorates far faster than from normal wear. In cool weather or on wet roads this heat is drawn out of the tires, which is why tires usually wear less and deteriorate less in winter and in rainy seasons than in summer. In extremely hot weather on dry roads, high speed eats the tire and tends to accelerate deterioration. Under these driving conditions, if the tire has previously been injured, high speed and the consequent excessive heat may lead to blowouts and other serious troubles. The practice of bleeding tires on long hauls has been found to be unsatisfactory. Tests have shown that this ac-

tuallly increases the temperature in the tire.

Quick Starting Is Injurious

10. Quick starting injures tires in much the same manner as quick stopping, except that the strain is in the opposite direction. Spinning the wheels in a quick start, or on a slippery road, injures tires unduly both through abrasion and through generating excessive heat. Instead of starting in low under such conditions, try starting in high. If this kills the engine, try starting slowly in second. If that does not get you out, you will eventually need

help, and there's no reason to spoil the tires by spinning them.

Do Not Abuse Tires

11. Do not bump into curbs or run over them. Tires have not yet been developed to a degree of perfection which permits this kind of abuse without injury. It may pinch the inner tube against the rim; it may tear a cord loose or break it. Then someday, perhaps a month later, your tire blows out and you blame everybody except the person who backed over the curb. Turn out for obstructions on the road. When your tires are hot their bruise

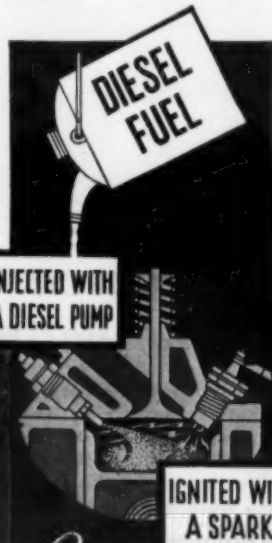
Proof of LOWEST FINAL

MODEL "L-O" ... 12.6¢ AN HOUR A Texas county commissioner reports that their 79 H.P. Model "L-O", pulling a 14-foot blade grader, uses only 2.8 gallons of Diesel fuel per hour, at 4.5 cents per gallon.

"K-O" SAVED 85% ON FUEL Near Phoenix, Ariz., two Model "K-O" Oil Tractors operated at a fuel cost of 90 cents each per day ... compared to a \$12.00 fuel cost for two 60 H.P. tractors on the same job.

25% MORE YARDAGE ... 10% LESS FUEL On U.S. Highway 12 in Michigan, a Model "L-O" Oil Tractor moved 100 yards of dirt per hour ... handling a 12-yard scraper. Diesel fuel used ... 4½ gallons per hour. Nearby, a Diesel tractor moved 80 yards per hour with the same type of scraper, on a shorter haul ... using 5 gallons of fuel per hour.

...



Gives you:
EASIER STARTING
SMOOTHER OPERATION
LESS VIBRATION
FEWER REPAIRS

In fuel costs ... and all other costs ... Allis-Chalmers Oil Tractors are setting new lows on job after job. Not just low fuel cost PER HOUR ... but low fuel cost PER UNIT OF WORK DONE ... and LOWEST FINAL COST per yard of dirt moved. These results offer positive proof that the "low compression" principle of A-C Oil Engines reduces tractor costs.



resistance is materially less than when cold. Small breaks in the fabric caused by striking rocks or other obstructions soon grow to large ones. Do not abuse the mate of a dual tire that has blown out or been punctured by running on it for any great distance. It will get you to a more convenient place for changing the tire, but you will probably injure it by doing so, so that eventually a carcass failure will develop.

When Steering Gets Queer

12. If the truck begins to steer queerly, slow down, pull off the road, and inspect all four tires carefully, all the

way around each one. Often this comes because a tire is preparing to blow. By stopping you not only may find the trouble and by changing tires avoid the personal danger, but also you can often get the tire repaired for small cost if you do not run on it until it blows.

Here They Are Concisely

This list of a dozen precautions looks more formidable than it really is. Here they are summarized in the fewest possible words.

1. Maintain rated air pressure.
2. Check new and newly mounted tires more often.
3. Shift your tires.
4. Keep good tires on the rear wheels as well as

- on the front.
5. Slow down for corners.
6. Brake gently.
7. Keep all wheels aligned.
8. Inspect tires occasionally.
9. Do not drive too fast on hot, dry roads.
10. Start up gently, do not spin your wheels.
11. Keep away from curbs and sharp bumps.
12. Inspect all tires when your car steers queerly.

If you and the drivers of all your cars and trucks will follow these simple rules, which will cost you very little in time or money, you will save money because you will find that you have to buy fewer tires. And if, perchance, you do not care about tire economies, then observe these dozen simple rules for the sake of your life and the safety of others.

Watch Your Engines In Winter Months

By FREDERICK W. KOERBER

ONE cause of considerable engine trouble, particularly in winter, is the cooling system. When the engine overheats, the cooling system is often to blame, but there are also many other causes that can bring about this condition. When the engine heats up, look for these causes.

1. Radiator may be empty or the level of water below that required. Refill.
2. The water jackets may be partly filled with water. This is a job for the repair man. On the other hand, the radiator may be clogged with sediment. In this case, secure some reliable cleaning compound and use. Flush with clean water and refill.
3. The use of certain anti-freezes and other cleansing chemicals often destroys the inside of the hose connections. The safe method is to replace hose connections in the spring and fall.
4. The water pump may be broken. To ascertain this, look into the radiator filler hole to see if the water circulates after it has become heated; idle the motor. If water does not circulate, then the pump is broken. In most instances the driving pin has been sheared, in which case it must be repaired.
5. Examine the fan belt to see that it is not slipping. Also see that the fan shaft bearings are properly lubricated.
6. The muffler may be clogged. Inspect and clean, if necessary.
7. Test the spark lever to make sure that the controlling arm on the breaker box moves when the spark lever is moved. If the spark has thus become retarded, this will cause overheating. See that operating rod is not loose or disconnected.
8. The crankcase oil supply may be down. Examine and if so, fill up; or if oil is too badly diluted, drain and refill with proper grade of oil.
9. The carburetor mixture may be too rich or too lean. In this case an adjustment will be necessary. If engine has previously worked properly do not disturb adjustment, as this is one part that is very sensitive and apt to cause much trouble unless handled by an expert.

In addition to the overheating of the cooling system, due to lack of lubricating oil, many other damages may result from the failure of lubrication circulation.

1. If water has found its way into the oil through a gasket leak or from the condensation of moisture in cold weather, it often results in the clogging of the pump intake or else forms a sludge that blocks the screens and oil lines. In winter, the crankcase should be periodically drained and a radiator cover used in cold weather.
2. See that all pipe connections are tight. Examine screen for sludge or dirt, and clean.
3. Watch the oil pressure gage regularly. When the gage shows no oil flow, the cause should be investigated immediately.
4. A low pressure in the oil system may indicate loose bearings. Tighten.
5. A high oil pressure often indicates clogged oil passages or cold oil. Run the engine slowly until the oil warms naturally.
6. If the crankcase has been emptied of all oil for cleaning or because of the fact that the oil supply has been used up, the oil pump may need priming. Fill through the priming plug in the pump body.
7. See that all pump connections are tight; else pump may not prime. Shellac to prevent leakage.
8. The pump spring or other mechanism may be broken. Have repaired.

The regular inspection of all parts of the vehicles will prevent such difficulties as have been discussed in this series of articles and will also prolong the life of the entire unit and cut down its operating overhead.

Can Concreting Be Done Successfully in Winter?

Experience answers "Yes," says the Portland Cement Association. There are few days in the year when low temperatures need stop concreting, provided the proper precautions are taken.

Winter is the logical time to build many needed improvements and the Association recommends that such work as airport improvements, bridges, culverts, foundations, grade separations, cribbing, sewage treatment works, sewers, sidewalks, water reservoirs and tanks, proceed without question during the winter months.

Brown Joins Worthington

J. H. Brown, formerly Eastern Sales Manager of Sullivan Machinery Co., has joined the Worthington Pump & Machinery Corp., of Harrison, N. J., as Regional Manager of its Construction and Mining Division, covering the mid-western territory, with headquarters in Chicago.

Mr. Brown is a graduate of Massachusetts Institute of Technology and during the N. R. A. served as a member of the Code Authority of the Compressed Air Institute.

LOW COST

● LOW FUEL COST
LOWER ORIGINAL COST
LOWER MAINTENANCE
LESS DEPRECIATION

ALLIS-CHALMERS OIL TRACTORS

TRACTOR DIVISION—MILWAUKEE, U. S. A.

N. Y. Building Foundation Dewatered by Wellpoints

On the foundation contract for the new Federal Office Building in New York City, the George J. Atwell Foundation Corp., contractor for the job, was faced with the problem of dewatering the subsoil to permit the capping of 112 caissons which were 4 to 8½ feet in diameter, and cut off 10 to

16 feet below water level.

The entire block, 203 x 380 feet, was a difficult one to drain as the subsoil consisted of a very fine sand and clay, sometimes called bulls liver. At the beginning of the work, twenty Griffin Jet N° Drive wellpoints, made by the Griffin Wellpoint Corp., 60 East 42nd St., New York City, were installed. Due to the Interflow design of these wellpoints, which prevents the screen from becoming blocked, they proved so effi-

cient in dewatering that the contractor increased the number to 180 wellpoints.

With this wellpoint system, it was possible to lower the water level an average of 14 inches a day.

Jones Joins Caterpillar

W. P. Jones, formerly northwestern representative for J. D. Adams Co., Indianapolis, Ind., has joined the sales

force of the Caterpillar Tractor Co., Peoria, Ill., specializing in governmental and construction sales. Mr. Jones has represented Adams in the Northwest for the last eight years and for the eight years preceding that period was a county engineer in Idaho in charge of construction and maintenance. He is well-known throughout the West and will handle that territory for Caterpillar, with headquarters at Spokane, Wash.

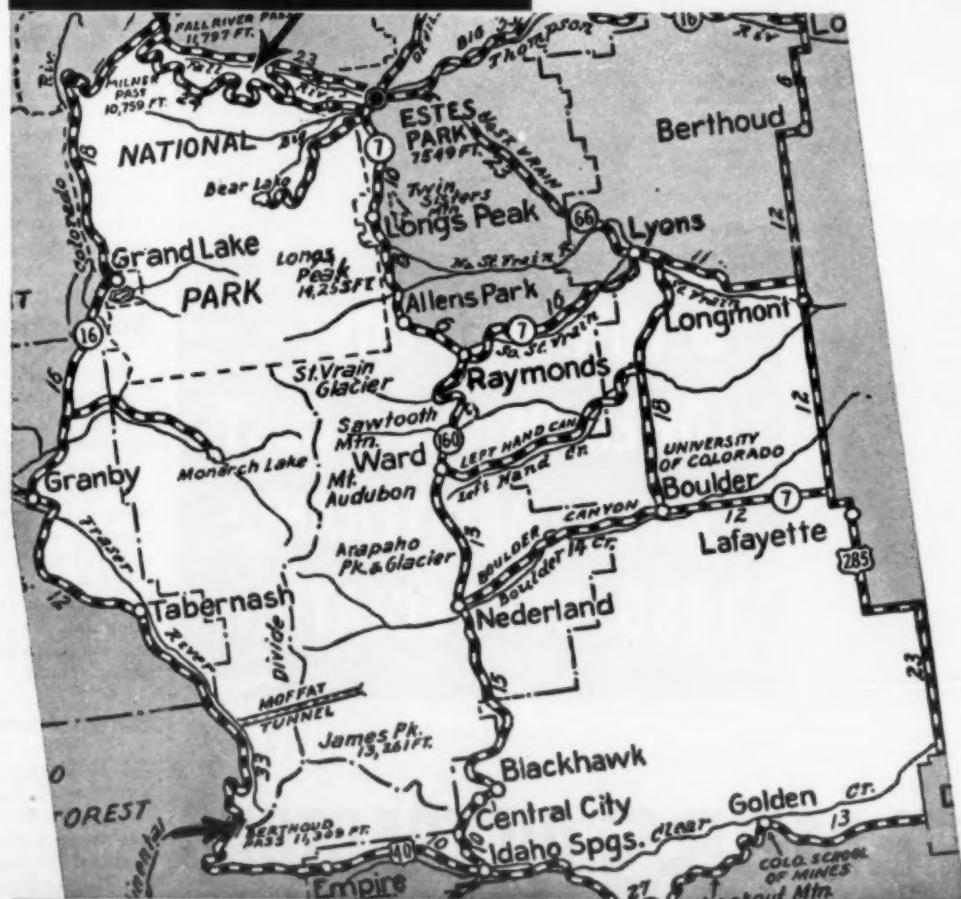
Non-skid Cut Back Asphalt surfaces

UNDER the supervision of the United States Bureau of Public Roads the highest highways in America (topping the Continental Divide) have been paved with Standard Oil (Indiana) Cut Back Asphalt in the last two years.

Below: Showing base treatment before final, non-skid surface was laid



The highest point on the Fall River Pass Highway, 12,183 feet, affords a horizon of unsurpassed grandeur to



FALL RIVER PASS HIGHWAY is but one of the three high mountain highways on which Standard Oil (Indiana) Asphalt has been used. Tennessee Pass, with an elevation of 10,240 feet, and Berthoud Pass at 11,375, were both completed in 1934, using Stanolind Cut Back Asphalt, mixed on the job. Hamilton & Gleason, Denver Contractors, paved the Berthoud Pass Highway last year.

ASPHALT FOR PAVING... ASPHALT FOR

New Detroit Manager for P&H

The Harnischfeger Corp., of Milwaukee, Wis., has announced the appointment of Frank Liebich as District Manager in charge of the company's operations in the Detroit territory. Mr. Liebich, who moves to Detroit from the company's Chicago office, will have charge of the complete line of products including excavators, cranes, welders, hoists, motors and lighting plants.

New Book on Road Materials

A revised and enlarged edition of "Standard Specifications for Highway Materials and Methods of Sampling and Testing," adopted by state highway departments and the U. S. Bureau of Public Roads, has recently been published by the American Association of State Highway Officials.

This book, designed as a guide for all those who furnish or use road building

materials required by Federal or State highway authorities, brings up to date the specifications included in the 1931 edition, eliminating such specifications which did not adequately cover the subject and including such new ones as have been adopted since that time. Copies of this book may be secured from the American Association of State Highway Officials, 1220 National Press Bldg., Washington, D. C. Price: \$2.00, postpaid.

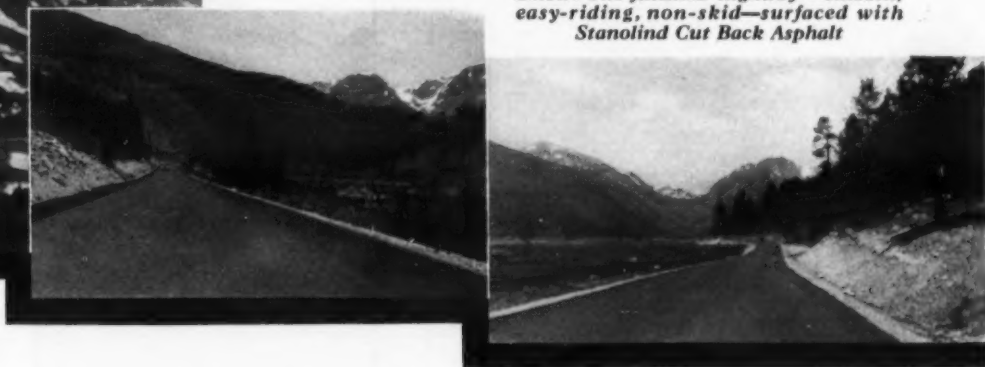
New Vice Pres. for A. I. S. C.

The Board of Directors of the American Institute of Steel Construction has voted to create a new office to be designated Executive Vice President and has elected Robert T. Brooks of New York to fill it. Mr. Brooks has been identified with the structural steel industry in New York for the past thirty years and for the past four years has been Treasurer of A. I. S. C.

the highest highways in America today!

CONTRACTORS Hamilton & Gleason, Denver, who paved the Berthoud Pass Highway last year, and Contractor C. V. Hallenbeck who paved the Tennessee Pass in 1934 and the Fall River Pass Highway this year, have completed outstanding work under unusually adverse conditions.

Below: The finished highway—smooth, easy-riding, non-skid—surfaced with Stanolind Cut Back Asphalt



motorists rolling over the fine modern pavement.

SCENIC highways of Colorado wear a new easy-riding, non-skid surface of Cut Back Asphalt. Berthoud Pass, Tennessee Pass and the Fall River Pass Highway have all been paved in the last two years.

These Colorado highways are now the highest paved through highways in the world. The pavement is a non-skid surface of Cut Back Asphalt. Rising at Fall River Pass, to a height of 12,183 feet, and open, heretofore, only five months of the year, the paving of these highways presented many unusual problems.

The engineers and contractors responsible for the success of the work deserve great credit. Climate, altitude, and the necessity of keeping the road clear, and scenic beauty unmarred, for tourists—these things and many more had left these jobs virtually "impossible" for many years.

STANDARD OIL COMPANY (INDIANA)
910 SOUTH MICHIGAN AVENUE, CHICAGO

© 1935, Standard Oil Co.

ASPHALT *for every Purpose*

Gravel Aggregate In Asphalt Mixtures

(Continued from page 1)

bility can be readily determined by using one of the laboratory machines for such measurement. The best known one in the east is the Hubbard-Field stability equipment, and every laboratory dealing with bituminous mixtures should have such equipment at its disposal. Originally the test was devised for sheet mixtures where the particles were $\frac{3}{8}$ -inch in their maximum dimension. The briquettes were 2 inches in diameter and for such fine-graded mixtures gave the desired results. With the rapid increase in mileage of low-cost surfaces and the use of mixtures with substantial percentages of particles ranging up to $1\frac{1}{4}$ inches in size, it became necessary to provide a method for their evaluation. The same Hubbard-Field machine is employed but the briquettes are made 6 inches in diameter so as to include aggregate up to $1\frac{1}{2}$ inches maximum dimension. With this equipment, both hot and cold mixes now can be accurately evaluated and road behavior predicted. Such tests should put an end to arbitrary specification requirements for a certain percentage of uncrushed particles without regard to the individual material characteristics.

Principles of Road-Mix Construction

It may be of interest to discuss briefly the basic principles which underlie the construction of the two varieties of road-mix surface. With the macadam aggregate type practically all particles are retained on a $\frac{1}{4}$ -inch screen with 100 per cent passing $1\frac{1}{2}$ inches. The mixture depends for its stability upon the interlocking of these rather coarse particles, and they are held in place and protected from moisture by a thick film of asphalt cement. The asphalt cement is applied to the aggregate in liquid form, either as a rapid-curing cut-back asphalt or as an emulsified asphalt. The cut-back asphalts are made from asphalt cement dissolved in naphtha or gasoline which may be controlled as to its rate of evaporation to provide for any particular manipulation requirements.

With the dense graded aggregates, stability depends upon the packing of the voids, so that each coarser size particle is held firmly in place by being surrounded by smaller sizes. The aggregate usually should all pass a $1\frac{1}{4}$ inch screen, with 35 to 65 per cent through a 10 mesh, and up to 14 per cent passing a 200 mesh sieve. This class of aggregate requires an asphaltic material of a different type from that used in coarse mixtures and, where cut-back asphalt is used, the asphalt cement is dissolved in a kerosene type of distillate. The setting of these mixtures does not result from the evaporation of the kerosene but its selective absorption by the fine-sized aggregate, thus making an asphalt-sand mortar which holds the coarser particles firmly together. Such a mixture never becomes hard in the same way that a macadam aggregate mixture does, may be reworked subsequently, if required by isolated subgrade failures, and yet at the same time will have the high stability sufficient to take the wear and tear of traffic.

It is very strongly felt that a large market is available for the dense-graded sand-gravel road-mix surface in the midwest and in the east. Complete specifications for such construction have been prepared by The Asphalt Institute and will be furnished to highway engineers free upon request.

Cold-Laid Plant Mixes

In an increasing number of instances existing gravel road surfaces are in

excellent condition; for example, where a stabilized gravel base has been built. For such situations it is often desirable to bring the gravel and asphalt to the road already mixed. There are a number of advantages in such pre-mixing as contrasted with road-mix; one, in the more accurate control of the desired different sizes of aggregate to obtain the maximum stability from a given material, and another, the use of a higher viscosity asphaltic material which permits quicker setting of the mixture after spreading on the road. The early work in the west was practically all road-mix, but with the increased length of contracts, it was found that there was often little if any difference in cost of the two.

Factors which bear upon the choice of plant-mix in place of road-mix include:

1. Tonnage involved (length of job).
2. Type and kind of traffic.
3. Ability to use some aggregates already on the road.
4. Climate and weather conditions.
5. Wage rates and respective plant costs.

The general grading characteristics and type of asphaltic material are shown in the following table:

Character of Aggregate (Mixture of Sand and Gravel)	Grade of Asphaltic Material*							
	(Med. Curing M.C. (Cut-Backs))				(Slow Curing S.C. (Oils))			
	1	2	3	4	5	1	2	3
Surfaces to be primed.....	X							
Road-mix, dense graded aggregate, 1" maximum size, traffic compacted.....								
Dry climate, cool weather.....		X					X	
Dry climate, hot weather.....		X						X
Severe climate.....		X						
Road-mix, open graded aggregate, high per cent through 10 mesh, low per cent through 200 mesh, requires roller compaction.....				X				
Cold-laid plant-mix, dense graded aggregate 1" maximum size, traffic compacted.....								
Dry climate.....			X					X
Severe climate.....								
Cold-laid plant-mix, open graded aggregate, high per cent through 10 mesh, low per cent through 200 mesh, requires roller compaction.....					X			
Cold-laid plant-mix, open graded aggregate, high per cent through $\frac{1}{2}$ " screen, no 200 mesh, requires roller compaction.....							X	

*The S.C. and M.C. products noted are those established as standard grades of liquid asphaltic materials by the U.S. Bureau of Public Roads.

Commercial sand and gravel aggregates differ widely in respect to percentage of any given size removed from

the pit. It is often possible, through suitable stability studies and the selection of an appropriate asphaltic material, to utilize more nearly the complete plant output.

It is to be noted that for the cold-laid plant-mixes, the higher-viscosity medium-curing cut-back asphalts or the high-viscosity road oils, which are practically soft asphalt cements in themselves, should be used. One great advantage of the dense-graded cold-laid mixture is the ability to stockpile in almost unlimited amount, due to the behaviour of the asphaltic material, particularly the medium-curing cut-back asphalts. It is perfectly possible to stockpile ten or twenty thousand tons of mixture and then weeks later, when the road base has been prepared, to mobilize equipment and spread the material at a very rapid rate. Such procedure eliminates inconvenience to traffic and also permits full use of good weather for the road surfacing operations. Also, in the preparation of the aggregates and mixtures a plant can

be operated at an efficient rate throughout the year.

Hot-Laid Plant Mixes

In the stability test is to be found the answer to the character of aggregates to be used, not only in the cold-laid mixes but also for the hot-laid plant mixtures. There is a large field for black base construction as it has been demonstrated beyond any question of doubt that surfaces placed upon phalitic concrete foundations do crack or otherwise deteriorate as compared with those laid upon rigid-type bases. Furthermore, by constructing such bases with coarse-graded mixtures it is possible to use completely sand and gravel plant output and thus reduce the cost of the mixture on the road. The Asphalt Institute has recently revised a number of specifications in this regard and will be pleased to furnish complete specification B dealing with black base construction and A-2, dealing with the wearing course.

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4.13 to 1

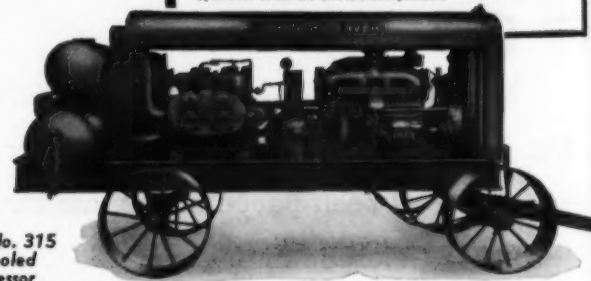
Specific Heat of Water at 180° F = 1.0019°

Specific Heat of Air at 100° F = 0.2420°

*Marks' Mech. Eng'g Handbook

1.0019 = 4.13 to 1 Ratio of heat-dissipating ability, Water over Air.

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Lubrication Queries

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Question

How may we prolong the life of wire rope on our power shovels?—Butte, Mont.

Answer

The December, 1934, issue of CONTRACTORS AND ENGINEERS MONTHLY contained a detailed discussion of this very question. We suggest that you read it carefully. It happens also that the December, 1934, issue of *Esso Oilways* published by the Standard Oil Companies of New Jersey, Pennsylvania and Louisiana and the Colonial Beacon Oil Co. contained a short article on this same subject. In direct answer to your question we are quoting from this latter article.

"No one would consider operating a large engine without suitable lubricants, yet many engineers transfer the tremendous power these engines generate through wire ropes without giving much thought to their lubrication.

"In a 100-foot section of 1-inch wire rope composed of six strands (thirty-seven wires to the strand) there are 335 square feet of frictional surface to be lubricated as the rope goes over the drum, sheave wheel, or pulley. As in any machine, high loads and speeds result in greater pressures and rubbing action of the wires, causing them to wear very quickly unless they are protected by a suitable lubricant.

"The elements, acid fumes, and water containing salts and acids, react readily with the high carbon steel wires causing them to rust, lose their strength, and increase the internal friction and wear of the rope.

"An abrasive action is produced when fine particles of dirt and grit work their way in between the strands and wires and cause serious wear and loss of strength.

"Due to the great amount of internal friction in the rope, it must be properly lubricated to prevent the breaking up of the wires and decay of the hemp center and consequent loss of strength and flexibility. A flexible rope handles better, lays better on the drum and saves power.

"The hemp core must be protected from impurities and moisture which cause it to rot away, for if the core rots out, the rope collapses.

"A properly lubricated rope will be

protected externally as it passes over the drum, sheave wheel, or pulley, and wear on the rope itself will be minimized. Proper lubrication also will keep the grooves in which the rope travels in good condition, thus further increasing the life and efficiency of the rope.

"A good wire rope lubricant must be a heavy mineral oil product, which does not contain fillers or acids. It must be able to protect, lubricate and keep the rope flexible. It must not evaporate, contain water or absorb moisture. It must squeeze out of the core and replace the lubricant lost as the rope is used. It must not peel, chip or crack under low temperature conditions, or decompose under high heat conditions. When heated and applied to the rope, it must fill the spaces between the wires and strands, penetrate to the core, and saturate it. It must be extremely tacky so as not to sling off at high speeds or when the rope vibrates." It must be applied regularly and at frequent intervals to replace the lubricant squeezed out and lost as the rope is used.

"One of the simplest means of lubricant application is as follows. Make a split box with a hole (slightly larger than the largest rope to be lubricated) in the bottom for vertical ropes, and a box with a hole in two opposite sides for horizontal ropes. Burlap is effective as a packing between the rope and the edges of the hole. The rope should be carefully cleaned with wire brushes and the box installed. The lubricant should be heated until it is a light liquid, then

poured into the box and the rope passed through at a slow rate of speed."

Another point to remember is that no one lubricant will serve for all classes of rope operations and a proper lubricant should be selected to fit the service for which it is intended. Practically all oil companies and lubricant manufacturers have experts who will be glad to recommend the type of lubricant required.

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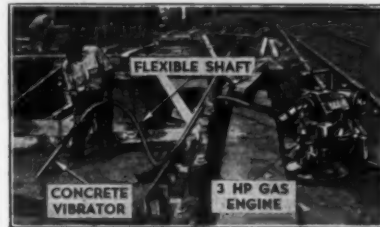
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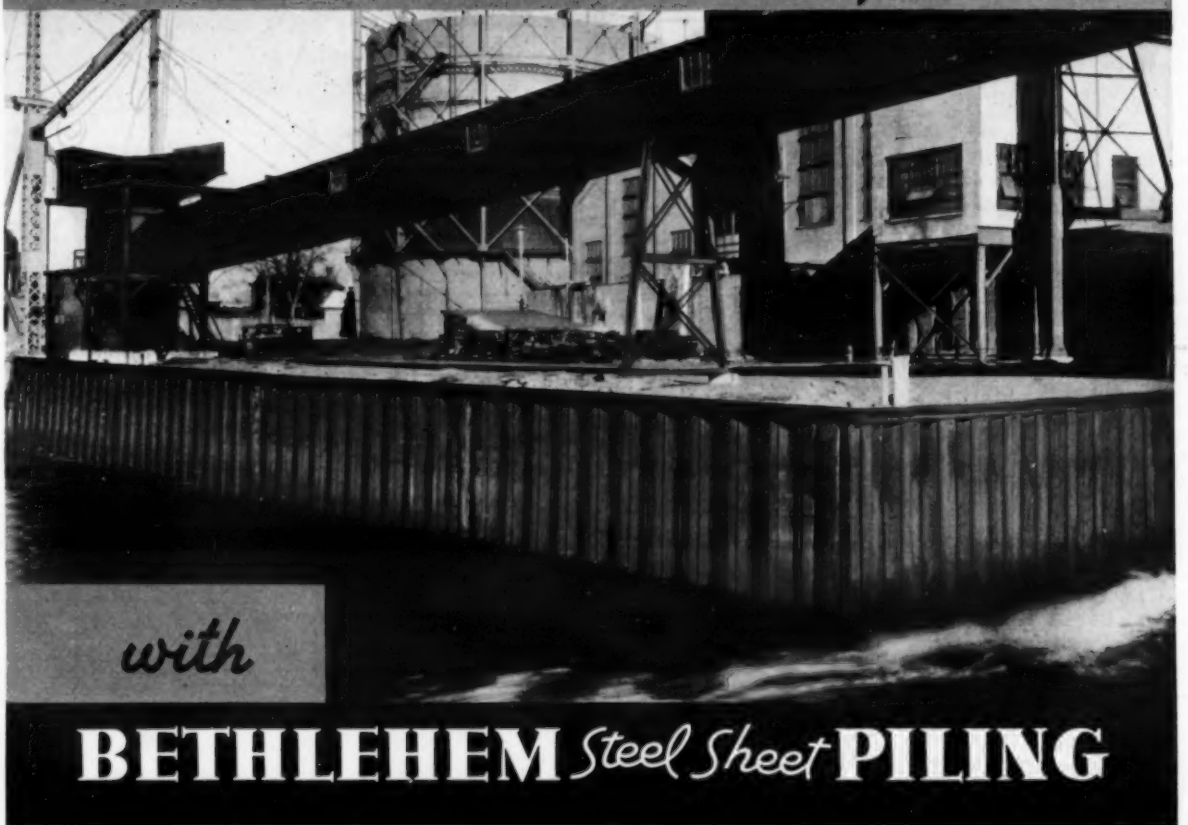
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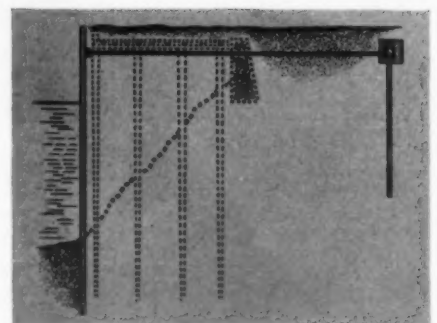


with BETHLEHEM Steel Sheet PILING

THIS new dock-wall of the Stamford Gas and Electric Company, Stamford, Conn., replacing an old timber structure, illustrates a very frequent use of Bethlehem Steel Sheet Piling.

The dock-wall, 170 ft. long, consists of 82 tons of Bethlehem Steel Sheet Piling, Section AP-3, driven to a depth of 11 ft. in the sand-and-gravel bottom, 18 ft. below mean low water. Tie rods extend from the wall to concrete anchor blocks, and these, in turn, are held in place by 25-ft. lengths of Bethlehem Piling, Section AP-14.

A very large number of old dock-walls of masonry or timber, in all parts of the country, have been replaced by strong, long-lasting structures built of Bethlehem Steel Sheet Piling. Dock-walls built of Bethlehem Piling cost less than any comparable type of construction, are strong and tight, and require virtually no maintenance.



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Diesel Units Provide Power at High Altitude

W. C. Burns, of Idaho Falls, Idaho, was awarded a contract last summer for 9.2 miles of 28-foot road between Victor and Driggs, on the Sugar City, Idaho to Jackson, Wyo., highway. To provide the material for this job, Burns set up two portable crushing outfits powered by two McCormick-Deering PD-40 diesel power units.

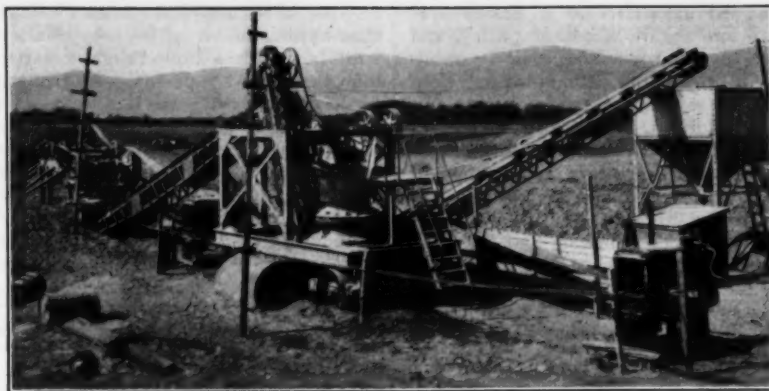
The complete outfit had a capacity of 80 tons an hour, one crusher breaking the material in sizes between 2 and 2½ inches and the other from very fine to ¾-inch.

The altitude at the installation is 8,000 feet. The crushing outfit had been powered with two 75-hp gas engines, but the loss of power because of the high elevation was so much that the contractor substituted the two diesel units. They provided ample power to operate the crushers at a cost of about \$1.00 per unit per day, compared to a previous cost of about \$5.00 a day for the gasoline units.

Highway Research Board Reports on Stabilization

The Highway Research Board has recently published a progress report submitted by the Project Committee on Stabilized Roads. Although the work is not yet complete, this report, because of the increasing interest in the stabilization of roads, is a timely publication and contains much valuable information. The subjects covered include a discussion of the general theory of soil stabilization; the design essentials of stable soil mixtures; typical soil mixtures; and the report of the subcommittee on treatment of roads with calcium chloride.

The members of the Project Committee on Stabilized Soil Road Surfaces are C. A. Hogentogler, Senior Highway Engineer, U. S. Bureau of Public Roads, Chairman; L. L. Allen, Assistant Engineer of Tests, Inspection and Research, Minnesota Highway Department; F. H. Eno, Research Professor, Ohio State University; J. W. Kushing, Research and Testing Engineer, Michigan Highway Department; W. H. Mills, Jr., South Carolina Highway Department; G. A. Rahn, Research Engineer, Pennsylvania Department of Highways; and



Diesel-Powered Portable Crushing Outfits Operating at an 8,000-Foot Altitude

E. A. Willis, U. S. Bureau of Public Roads.

The Highway Research Board has also announced the organization of a Subcommittee on Treatment of Stabilized Road Surfaces with Salt (sodium chloride) and Other Deflocculating

Chemical Substances, as follows: J. W. Kushing, Research Engineer, Michigan Highway Department, Chairman; Henry Aaron, U. S. Bureau of Public Roads; Harold Allen, Kansas State Highway Commission; C. D. Looker, International Salt Co.; C. W. McClain, Indiana

State Highway Commission; R. M. Rowat, Canadian Industries, Ltd.; and Arthur R. Smith, Indiana State Highway Commission.

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Rejuvenated by **I-BEAM-LOK**

Rerouting of traffic in Forest Park, St. Louis, made it necessary to refloor the Lafayette Bridge to conform to H-20 loading, so that it could be used by heavy double-deck park buses weighing 14 to 18 tons unloaded. The bridge consisted of four braced arch supporting ribs with a ¼" plate deck which was

seriously corroded and buckled. Superior Structural Steel Company, contractors, selected I-Beam-Lok for the reflooring. Because of the strength and light weight of I-Beam-Lok, no change in the bridge structure was necessary to secure the increased loading capacity.



The advantages of I-Beam-Lok apply to small and large, new and old bridges. The finished floor is an armored concrete, anti-skid surface of enduring satisfaction. Progressive concrete cracks are impossible. Speedy erection is fa-

cilitated by the fact that delivery trucks and concrete mixers can be run over the unfilled units as soon as they are secured to bridge stringers. A copy of the I-Beam-Lok Booklet will gladly be sent upon request.



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Miss. River Dam 16 at Muscatine, Iowa

(Continued from page 5)

sand bar and the dredged fill the contractor established the office for the job, engineer's office and tool house, store house and machine shop, thus centralizing the entire operation at one point. The storage and machine shop were housed in one structure 30 x 80 feet with adequate space for the drill presses, lathes and other units so important to the upkeep of equipment on a project of this type. The store house kept a full stock of repair parts, fittings, etc., on hand even though the contractor's yard with its large warehouse and shop was only 29 miles distant in Davenport. A Caterpillar Sixty was used for heavy hauling on the sandy terrain, even hauling the coal for the Bucyrus-Erie steam crane on a stone boat.

Subcontracts

The entire foundation for the dam is carried on wood piles with a diaphragm of steel sheet piling as a cut-off wall. E. A. Whitney of Kansas City, Mo., was the subcontractor on driving the wood piling. R. C. Mahon Co., of Detroit, Mich., furnished and set all steel work including the Tainter gates, the roller gates, and the service bridge. LaCrosse Dredging Co. of Minneapolis, Minn., made all the dredged fill amounting to about 1,000,000 cubic yards.

Quantities and Prices

Item	Quantity	Unit Price
Cofferdam	1,151 linear feet	\$187.50
Excavation, common	82,500 cubic yards	.35
Excavation, dredged	775,000 cubic yards	.13
Excavation, rock	200 cubic yards	3.00
Chameling, rock	800 square feet	1.50
Drilled holes; grout		
first 10 feet	60 linear feet	.75
Drilled holes; grout		
second 10 feet	30 linear feet	1.00
Pressure grouting; cement	10 barrels	10.00
Fill	20,500 cubic yards	.25
Embankment, dike	35,000 cubic yards	.25
Piling, timber	170,000 linear feet	.545
Piling, timber batter	7,820 linear feet	.695
Piling, concrete	3,600 linear feet	2.30
Piling, steel sheet	168,100 square feet	1.30
Timber, oak	19 M.F. B. M.	165.00
Timber, crooked	38 M.F. B. M.	158.00
Some, protection, derick	13,920 cubic yards	3.75
Some, protection, riprap	11,400 cubic yards	3.00
Gravel embankment		
protection	1,900 cubic yards	2.50
Concrete, Class A	1,060 cubic yards	20.00
Concrete, Class B	59,000 cubic yards	9.88
Structural steel, service bridge	1,375,000 pounds	.06
Structural steel, Tainter gate	1,330,000 pounds	.055
Structural steel, roller gate	1,005,000 pounds	.065
Structural steel, misc.	1,135,000 pounds	.063
Steel, reinforcing	2,560,000 pounds	.04
Steel, corrosion resisting	26,500 pounds	.60
Steel forgings, carbon	126,000 pounds	.10
Steel forgings, alloy	50,300 pounds	.14
Steel castings, Class B	236,000 pounds	.13

Personnel

The general contractor for Dam 16 of the Mississippi River navigation projects located at Muscatine, Iowa, is Central Engineering Co., Davenport, Iowa, which received the contract on its original low bid of \$2,053,130. Arthur E. (Art) Cossens was Superintendent for the contractor throughout the work. The work was under the direction of the Rock Island District Office, Engineer Corps, U.S.A., Major R. A. Wheeler, District Engineer, with O. R. Ramser as Resident Engineer on the locks and Capt. Henry Berbert on the dam.

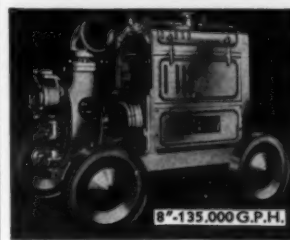
New England Roadbuilders Show Machinery at Fair

For "Seven Days and Seven Nights, Gentlemen" a road machinery show was held at the famous Brockton Fair, Brockton, Mass., under the auspices of the Massachusetts Highway Association and sponsored by the New England Road Builders' Association and the New England Equipment Dealers Association. The feature of the Show was the Annual Meeting of the Massachusetts Highway Association on September 11 and the Annual Outing of the New Hampshire and Rhode Island Highway Associations on the same day. The exhibits, in charge of E. F. Lamprey, covered several acres. The exhibitors included Acme Power Equip-

ment Co., and Acme Road Machinery Co., showing Acme road machinery; Alexander Supply Co., Austin-Western road machinery; Autocar Sales & Service Co., Autocar trucks; The Barrett Co., Tarvia distributors; Clark Wilcox Co., distributor, featuring Allis-Chalmers tractors, Northwest shovels, Ross snow plows and Ingersoll-Rand compressors; Conant Machinery & Steel Co., loaders and conveyors; Dyar Sales & Machinery Co., Adnun bituminous spreaders, Baker snow plows and Adams graders; W. W. Field & Son, Worthington compressors; Ford Motor Co., trucks; Four Wheel Drive Auto Co., trucks; Frink Snow Plow Co., snow plows; Hedge & Mattheis Co., featuring Frink snow plows, the Lima shovel and Ingersoll-Rand equipment; International Harvester Co., trucks and tractors; Jaeger-Lakewood Co., road machinery; Mack Truck Co., trucks; New England Metal Culvert Co., culverts; New England Toro Co., lawn mowers; P. I. Perkins Co., Caterpillar

tractors and Sargent snow plows; Power Lawn Mower Service Co., lawn mowers; Sandberg Truck & Equipment Co., McCormick-Deering tractors; Springfield Commercial Body Co., truck and school bodies; Weymouth Asphalt Concrete Co., asphalt products; White Motor Truck Co., trucks; C. N. Wood Co., Walter snow fighters; Barber-Greene Co., snow loaders; H. F. Davis

Tractor Co., Cletrac crawler tractors; Buffalo-Springfield Roller Co., road rollers; Cahill Motors Co., Dodge trucks; Sterling Motor Co., trucks; New England Auto Body Co., truck bodies; Malleable Iron Fittings Co., cable guard rail fittings; New England Fence Co., snow fence; Nelson Cement Stone Co., edgestone; Solvay Sales Corp., calcium chloride.



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... the Portable Patch Roller and the "Junior Patrol" Motor Grader ... recently added to our line of Road Machinery ... effect economies in maintenance work heretofore unattained.

In their design Galion Engineers constantly kept in mind ... less weight ... low investment cost ... cheaper operation. They succeeded far beyond expectations ... producing two improved units with the same developments and advantages of the heavier and higher priced machines.

The Galion Portable Patch Roller is a machine of great versatility ... suitable for rolling all kinds of patch material ... for compacting loose material, rolling drives, etc. Weighs up to 8600 lbs. and is easily transported from place to place. Bulletin No. 184 gives complete details. The Galion "Junior Patrol," equipped with Hydraulic Control, meets a long felt need for a light, inexpensive motor grader for maintenance work in townships, counties, cities and villages. Bulletin No. 192, just off the press, goes into detail.

Send for a copy of these new Bulletins. Do it NOW.

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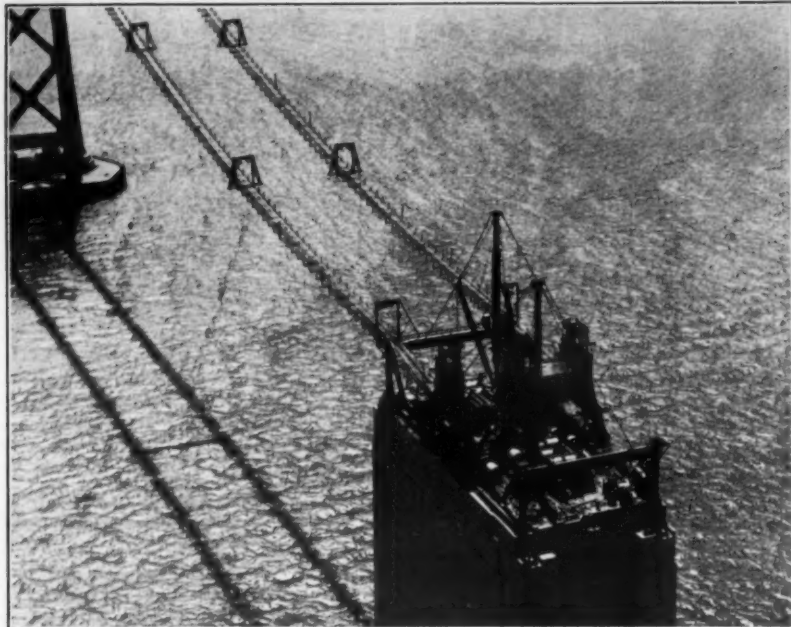


Large view above shows the Galion Patch Roller compacting patch material. An ideal tool for this sort of work. View next above shows the roller in position for towing, portability being one of its outstanding features.

The convenient control on the "Junior Patrol" Grader is shown at the right. It has full hydraulic operation, reducing the number of working parts. View below shows this New Grader "on the job."



THE CATWALK'S END



The Aerial Photographer for the San Francisco-Oakland Bay Bridge Flew Close to Pier W-4 to Catch This View of the Top of the 235-Foot Concrete Center Anchorage at the Eastern End of the Catwalks. The Spools of Wire on Top of the Anchorage Are Nearly 3 Feet in Diameter and Each Contains 70 Miles of Pencil-Size Wire for the Strands of the Cable.

Compact Welding Unit Built on Light Tractor

A compact welding unit consisting of a General Electric generator mounted on a Caterpillar Twenty-Eight tractor has been announced as a standard addition to the products of the Caterpillar Tractor Co., Peoria, Ill. From the tractor engine flywheel back, the platform has been redesigned to include an enclosed generator and equipment. Compactness is attained through the arrangement of the generator and its accessories. The controls and seat of the tractor have been moved to the right, permitting comfortable and convenient tractor operation.

The generator is 300 amperes, 40-volt and of the D.C. type. It is operated by a power take-off at the rear of the tractor through a V-belt drive. The control panel is handily located on the right rear side of the tractor. Compartments are built at the rear of the unit for reeling and storing welding cable and to keep an ample supply of welding rods. A hinged steel cover and compartment doors fitted with hasps and locks protect the entire assembly and tractor operating space from pilferage and weather.

A Truck-Mounted Crusher

A new portable rock crushing unit mounted on a 3-ton truck of the seat-over-motor type has been announced by the Four Wheel Drive Auto Co., Clintonville, Wis. The overhead eccentric-type rock crusher mounted on the rear of the frame and driven by the truck motor is equipped with continuous bucket feeding and loading elevators of the belt type.

The rock crusher is driven direct from the main shaft of the transmission. With a governed engine speed of 1,200 rpm in direct drive and by means of a four to one reduction in the drive sprockets of the crusher, a crushing speed of 300 rpm can be maintained. The rated capacity of the unit at this speed ranges from 50 to 125 tons per day.

The four driving wheels of the FWD truck make it possible to negotiate difficult terrain in moving to and from locations and the short wheel base permits maneuvering in cramped quarters on roads, roadside quarries and in temporary quarries opened for specific contracts.

New Light-Weight Magneto

A compact magneto built with aluminum die-castings effecting saving in weight and which has already aroused considerable favorable interest from a technical and engineering standpoint, has been announced by Wico Electric Co., Springfield, Mass. The aluminum die-castings have saved from 30 to 50 per cent in weight over magnetos of the conventional rotary type. The use of needle bearings and circulating lubrication has made possible higher speeds than have been successfully attained heretofore.

The carefully engineered mechanical design, plus the approach to perfect balance in the electrical circuit, have contributed considerably toward this attainment. On tests, the magneto ran continuously for 2,185 hours at a speed of 6,500 rpm, without any appreciable wear on any part of the magneto except contact points and breaker bar. The function of each of these, however, is

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Manufacturers of CONTRACTOR'S, INDUSTRIAL AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA

such that there is compensation in the wear on the breaker shoe for that taking place on the movable contact point.

Vibrating Screens Float Suspended by Cables

The suspension of vibrating screens by cables and springs to reduce the vibration of the structure carrying the screens is a feature of the Aero-Vibe screen made by Allis-Chalmers Mfg. Co., Milwaukee, Wis. Material fed to this screen is subject to a rapid vibratory motion produced by counter-weighted wheels mounted on the drive shaft carried in anti-friction bearings attached to the screen body.

The body or vibrating member is made of two steel side plates reinforced by vertical angles. They are securely connected together by cross members which carry the longitudinal screen supports.

Aero-Vibe screens are built with one or two decks, which are supported by longitudinal bars extending the full length of the body and form a support for the cloth. These bars are protected with self-clamping protectors made of special rubber stock to resist pressure and abrasion. The screen surfaces are supplied with wire cloth, one piece to the deck. When the cloth is made of small diameter wire, hook plates are bolted to the cloth; for larger diameter wire the cloth is bent along the sides to form hooks which engage with clamp plates extending the full length of the body. Bolts attached to the clamping plates pass through holes in the screen body. These bolts are provided with compression springs which maintain a constant and uniform tension on the cloth.

The screen decks are removed by backing off the tension bolt nuts located on the outside of the body. This releases the clamp plates and permits the removal of the deck from the screen body without removing the clamp plates. Aero-Vibe screens are described in detail in Bulletin 1474A which may be secured direct from Allis-Chalmers Manufacturing Co. by readers of CONTRACTORS AND ENGINEERS MONTHLY.



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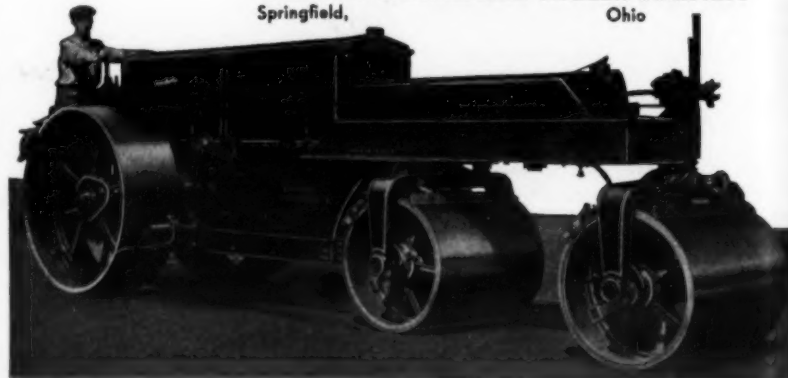
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Big Traffic Circle First in New York State

By J. W. HOLLER, District Engineer,
New York Department of Public Works

THE intersection at Latham Corners, Albany County, N. Y., of two of the most important and heavily-traveled New York State routes, one U. S. 9 into which traffic from New York City on U. S. 9 and U. S. 9W combine to follow the single Route 9 north, and Route 7, carrying traffic from Massachusetts westerly through Troy and Schenectady, has recently been improved by the construction of a traffic circle on a reconstructed portion of this highway.

These routes formerly intersected at a point about 700 feet east of the new location, where with no anticipation of traffic assuming the tremendous proportions that have developed in the past twenty years, insufficient width was provided to meet present day conditions. A small community at this point grew steadily and, through building operations, developed an intersection of two highways crossing at right angles, with buildings contained almost to the pavement edges.

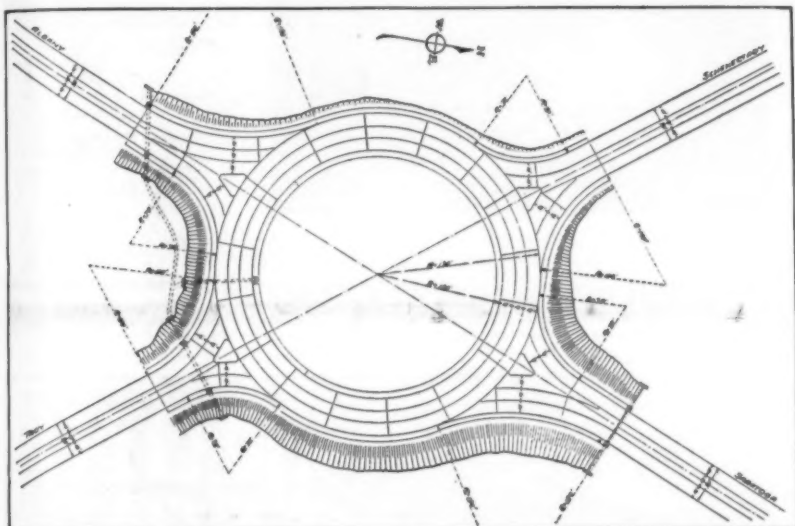
Hazards of Intersection Eliminated Economically by 260-Foot Traffic Circle

The outside diameter of the circle, exclusive of the gutter, is 260 feet, while the inside diameter is 200 feet, with the width of driving area of pavement, including gutters, being 38 feet.

Drainage for the entire area included in the 260-foot circle is taken to the inside gutter with run-off being provided through catch basins and under-drainage to an adjacent natural stream.

Self-reflecting button signs erected on the right of the highway, 250 to 300 feet from each of the four entrances, announce the presence of the circle to motorists. White lines painted on the pavement, extending 300 feet from each entrance, contract the three-lane traffic to two lanes, representing one line entering the circle and a second line leaving it.

Each of the islands at the four entrances contain additional self-reflecting



This New 260-Foot Traffic Circle Near Albany, N. Y., Is The Largest in the State and Helps Traffic Greatly

To eliminate the hazards of this intersection, a new location for this portion of Route 9 was chosen for three reasons: first, a far superior alignment of the highway; second, to by-pass a congested community; and third, to secure additional area and special arrangements to move traffic safely.

A separation of grades with some sort of arrangement following the principle of the clover-leaf design was carefully considered in treating this location. In order to use best the limited funds available, the construction of a traffic circle rather than the clover-leaf was decided upon, inasmuch as the cost of the former was found to be approximately \$10,000 as against a cost of \$100,000 if structures were built to carry north and south traffic over that moving east and west.

Another factor which contributed to this conclusion was the enormously larger area requirements for the clover-leaf in a territory where rights-of-way are expensive, and the consequent property damage would have been prohibitively costly to the county, which is the subdivision of government required to provide lands for state highway construction.

Construction of Circle

The circle forms part of a 30-foot concrete roadway with the full width of 30 feet of pavement, plus the additional driving area provided by 4-foot concrete gutters on either side, being continued throughout the circle.

button signs, inscribed with the names of the cities beyond, with arrows pointing in the proper direction. With added button signs directing traffic to keep to the right, motorists appear to encounter no confusion whatsoever.

As an additional feature, in an endeavor to safeguard further the vehicular movements at this point, the Department of Public Works plans to erect in each of the islands, at the point representing the entrance to the circle, flashing beacons with the lights screened from view in all directions except that of approach on entering.

Controlling Snowdrifts on Wyoming Highways

To prevent the large amount of snow encountered on the Continental Divide from drifting onto the highways, the Wyoming Highway Department uses sectional wooden snow fence which can be raised as the snow accumulates. Last winter, one string of sectional fence accumulated a drift 1,600 feet long, 100 to 400 feet wide and from 15 to 40 feet deep during a 26-day period of continuous drifting. It was often necessary to reset the fence three or four times daily. —From Highway Research Abstracts.

The construction of the San Francisco-Oakland Bay Bridge involves the largest bore rock tunnel ever attempted, the finished inside clear diameter of the tunnel being 65 feet 6 inches.

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The A-W 12-Yard Scraper Carries Its Own Power

New 12-Yard Scraper Built of Alloy Steel

A 12-yard hydraulic scraper, constructed throughout of special alloy steel to make it lighter in weight but stronger, and welded, has been announced by Austin-Western Road Machinery Co., Aurora, Ill. This self-contained scraper carries its own motor, hydraulic pump and primary control apparatus. The only connections between the tractor and the scraper are the drawbar pin and a small electrical cable with a quick release attachment plug.

With this construction and arrangement, the entire output of tractor power is devoted to pulling the scraper. The remote control of the scraper consists of small electrical push-down switches at the operator's elbow, controlling the hydraulic valves which are located on the scraper to cause the scraper to dig, carry or unload. The scraper has an open top for loading with shovel or elevating grader if desired.

Four hydraulic rams are used to raise and lower the pan, raise and lower the front gate and for moving the pan forward to unload. The load is forced out, not merely dumped. The wheels are equipped with Timken bearings and 13.5 x 20-inch pneumatic tires.

New Line of Two-Stage Air-Cooled Compressors

A new line of air compressors, embodying a number of new refinements and improvements, has recently been announced by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City. These new two-stage compressors, with air-cooled intercooler, Simplate valves and smooth unrestricted air passages, are claimed to require approximately 15 per cent less power per foot of air delivered, at 100 pounds pressure.

Only two air cylinders are used on the two smallest sizes and four on the larger, cast in pairs. Their vertical in-line arrangement permits using a separate crank pin for each connecting rod, facilitating crank pin bearing adjustment, locates all cylinders in the direct path of the blast of cool air and simplifies the piping.

The low-pressure and high-pressure assemblies are accurately balanced and the crankshaft counterbalanced, for smoothness of operation. Force feed



The New C-P Two-Stage Air Compressor

lubrication provides a positive and controlled supply of oil for the cylinders and bearings. An air-cooled finned intercooler, with sectionalized core and served by a fan V belt driven from the compressor crankshaft, cools the air between stages. The intercooler also removes moisture, so that the delivered air is drier as well as cooler.

These C-P compressors come in sizes ranging in actual capacities of 85 to 256 cfm at 690 rpm, and 108 to 323 cfm at 870 rpm.

Portable Testing Machine for Welded Specimens

The growing demand for accurate knowledge of weld strength is the natural result of the great developments in welding. To provide the opportunity for such knowledge right on the job, the Air Reduction Sales Co., Lincoln Bldg., New York City, has developed the Airco portable tensile and bend testing machine, which is a compact, comparatively light machine which can be carried right to the welding job so that specimens can be tested on the spot.

The machine consists of a hand-operated oil pump, a hydraulically actuated piston or ram, two heads, one fixed and one movable, for gripping the test specimens, and four symmetrically located steel shafts, two of which transmit the piston motion and load to the movable head. The other two shafts maintain the alignment of the two heads, and prevent the introduction of bending stresses in the tensile specimen.

This machine is described in detail and illustrated in literature which may be secured direct from the Air Reduction Sales Co.

Picks and Shovels

(Continued from page 1)

these two farms lie in opposite directions from the store. To be perfectly fair it would be necessary to build two 20-foot macadam farm-to-market roads at a cost of \$100,000 apiece in order to facilitate the movement of fifty ears of corn, half a bushel of spinach and a dozen bunches of beets and carrots per farm per day for a few weeks per year. The question is 'Would it pay?'

There are, Mr. Pegler points out, many other local projects about which the citizens could get much more enthusiastic than a farm-to-market road, — a badly needed new schoolhouse or a fire house in which to store the fire engine which now stands in somebody's barn. But the appropriation says it has positively got to be spent for a macadam road 20 feet wide which has got to lead from some farm to some market.

"The State engineer's man has been traveling constantly," Pegler continues, "covering 7,000 dirt roads in the county and peering into flower gardens to detect an ear of corn or a tomato which would bring the premises into the farm

category within the meaning of the Act.

"But the citizens stoutly deny that their corn or tomatoes, if any, are professional corn or tomatoes and threaten to sell out and move to Vermont if the farm-to-market road goes past their place."

Here's Another One

The problem of the residents of Scott's Corners reminds us of the story told by Boake Carter the other evening. There is a town in one of the Dakotas which during the past year lost its schoolhouse by fire. In view of the fact that the citizenry of that community were anxious to replace the school, they voted to finance half the cost of a new school, if the other half could be secured from the Emergency Relief Appropriation.

After the usual amount of red tape had been untangled, it was learned that

such a project would not meet the specifications of the Relief Act. Too much money would go into materials and not enough direct to labor. So the town must go without its schoolhouse, but Uncle Sam is financing a park and a perfectly lovely bird sanctuary!



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Excavating Canals on Loup River Project

(Continued from page 1)

crossed the tail race excavation was taken care of during excavation by building a suspension cable to swing it across the channel. Later this will be carried on a steel truss over the tail race. The depth of water in the tail race will be 19 feet, and the velocity about 3 feet per second.

The Columbus Intake Canal

Contract 6 for the building of earth embankments for the Columbus Power House intake for a distance of about 1.5 miles was awarded to Peter Kiewit Sons Co. and George W. Condon Co., of Omaha, Nebr., bidding in combination. In addition this same contracting organization had the construction of the reservoir control weir.

The intake canal or forebay involved the selection of proper material for the embankments, placing of the material properly wet down to give maximum density under the control of special field soil laboratories, and its compaction with sheepfoot rollers. A line of 6-inch concrete tile drain was laid beneath the two embankments surrounded by two sizes of graded gravel 8 inches thick and 6 inches of sand. The embankment was spread in 8-inch layers loose and then rolled.

The equipment required for this work was quite extensive. It included: one Allis-Chalmers elevating grader with 42-inch power-driven belt, one Adams power elevating grader of the same size, seven Euclid Trac-Truks of 8-cubic yard capacity equipped with Goodyear tires, a Ted Carr scarifier, an Allis-Chalmers Model K tractor with a Baker bulldozer and International gang disc harrow, a Farmall tractor, two Galion No. 12 leaning wheel graders with A-C Model L tractors and another Model L with Le-Tourneau sheepfoot rollers in tandem.

In order to add the required moisture to the various loads of earth as placed and analyzed on the spot by the portable soil laboratories the contractor had two International trucks with 1,500-gallon tanks and home-made sprinklers composed of welded sheet metal boxes about 8 feet long and 8 inches wide at the top and tapered to 4 inches wide at the bottom. These were slotted with cold chisel cuts to give a fairly uniform spray for the full length of the box.

Carefully worked out diagrams developed by K. H. Talbot, in charge of the soil laboratory, (which will be described in our November issue) showed the amount of water to be added per cubic yard of soil based on the results of the field tests with the Proctor plasticity needle. Thus immediately after a test the field engineer could tell the contractor the amount of water to be added to the soil to give the optimum density.

Water for the sprinkling was secured from a 100-foot well close to the center of the construction. It was pumped to an 18,000-gallon steel tank from which the tank trucks were quickly filled. For night work the contractor built two floodlight towers of unusual construction. They are of wood lattice construction mounted on skids and carrying a shed with a Kohler 2,000-watt electric plant and two 110-volt floodlights mounted at the top.

Contract 6 involved the following quantities: 1,200,000 cubic yards of canal excavation, with 375,000 cubic yards of stripping; 345,000 cubic yards in reservoir dikes; canal embankment requiring 9,600,000 station-yards of overhaul (1 station free haul); and 150,000 cubic yards of reservoir levees. The contractor worked 21½ hours a day and the intake canal embankment

construction was pushed at about 5,000 cubic yards a day.

The Reservoir Control Weir

The same contractor built the reservoir control weir, which is quite different from the customary type of control weir. Instead of a straight weir crest it is broken into a series of 60 degree V's, thus lengthening the crest in a given horizontal plane but making a distinct saving in the base slab. The coefficient for this type of weir is 1.6 as compared to the straight weir occupying the same horizontal space.

For the pouring of the concrete at this isolated point the contractor used a Rex 10S mixer, measuring the aggregates in Sterling wheelbarrows weighed on Winslow wheelbarrow scales. The cement was stored in an old truck body which announced to those who would stop to read that so-and so's crackers give zest to life. Two men shoveled and wheeled the stone and the same for the sand. The truck driver who hauled the water in to fill the large cattle watering tank handled the cement at the mixer. There were four puddlers and two finishers when running concrete. The placing of the concrete was greatly speeded by the use of a Mall gas-engine-driven vibrator. A Bucyrus-Erie 1030 dragline was used for the excavation of the weir site and the same machine used for the driving of the steel sheet piling for the cut-off wall. Carnegie M-K 115 steel sheet piling was used with a ¾ x 18-inch web. A Barnes force pump supplied the water to the mixer and a Rex diaphragm pump kept the excavation dry ahead of concreting. There were two carpenters, two steel men and two steel carriers for each 5-hour shift on this part of the work. The concrete was placed by a 1-yard Insley bottom-dump concrete bucket swung by the dragline.

Main Canal Excavation

Haas, Doughty & Jones of San Francisco, Calif., was the contractor for the excavation of 10 miles of the main canal from the Monroe Power House to the reservoir. The original section for this canal had no berm below the freeboard line. The work now under way requires a 6-foot berm at ground line provided there is no extra cost to the contractor. This berm will take care of bank sloughing during wet weather.

On later contracts a 6-foot berm is required 2 feet below the water line to take care of wash from the banks by rain and from eddies. It is expected that vegetation growing at this depth will hold the soil on the berm.

This contractor used a new Bucyrus-Monighan 5W with a 6-yard bucket. They ran into strata of blow sand at a depth of about 20 feet at the east end of the canal and at 10 to 15 feet at the west end. This stratum runs well below the bottom of the canal and is quite white in color. A Bucyrus-Erie 50B dragline was also used on this work with a 2½-yard bucket. This section of canal has a bottom width of 39 feet and will carry 19½ feet of water. The side slopes are 1½ to 1.

The total excavation on this contract included 100,000 cubic yards of stripping and 2,400,000 cubic yards of earth excavation. The Monighan, working 24-hours a day, handled about 5,500 cubic yards and the Bucyrus-Erie 50B about 2,600 cubic yards.

Upper Canal to Head Works

W. S. Hardwick of Memphis, Tenn., was the contractor for the upper end of the canal from the Monroe power house to the head works about 3 miles above Genoa, Nebr. This contractor used a Bucyrus-Erie diesel crawler dragline with a 50-foot boom and a 2-yard bucket on stripping and a Bucyrus-Monighan 6W with a 120-foot boom and 8-yard bucket on excavation.

This contract No. 4 called for the



C. & E.M. Photo
Floodlight Tower and Electric Plant Mounted on Skids Used by Contractors for Columbus Intake Canal

removal of 350,000 cubic yards of stripping and 2,500,000 cubic yards of earth excavation. The Monighan on this work operated 22½ hours a day and



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Accurate control of materials to comply with any standard specifications for bituminous mixtures.

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HETHERINGTON AND BERNER INC
Indianapolis, Indiana

accounted for an average of 7,300 cubic yards daily.

Personnel

The entire Loup River project is expected to be completed in September, 1936. It may then require several months properly to silt the canals to water tightness so that there will not be too great losses through seepage which also might be damaging to the lands nearby used for crops. The engineering work for the entire project has been handled by the Harza Engineering Co., consulting engineers of Chicago, Ill., which has maintained a large staff for design and superintendence of construction at Columbus, Nebr. L. F. Harza, M.Am.Soc.C.E., is President, Eric Floor, Vice President in charge, Frank E. Peacock, Chief Designing Engineer, A. J. R. Houston, Engineer of Specifications, C. E. Wattles and H. A. Beckwith, Engineers in charge of construction for the Loup River Project.

Grade crossing programs, to be carried out with Works Progress Highway Funds, have been received by the U. S. Bureau of Public Roads from Michigan, Alabama, Wisconsin, Oregon, Idaho, District of Columbia, Mississippi, Wyoming, Indiana, Vermont and Utah.



Buffaloes Are Replaced by Modern Dirt-Moving Units on the Hills and Plains Once Roamed by Buffalo Bill

Buffalo Bill Country Is Modernized

In the rip-roaring days of Buffalo Bill Cody, the country around the Wyoming city which bears his name was wild and woolly in keeping with the times. Travel was tedious and hazardous, made more so by wandering bands of Indians. It was here that the famous Wild West figure stalked beast and redskin, compiling a colorful career whose episodes have contributed much to the westward hitch-hiking of small boys, especially when the first school bell rings in the fall.

If Buffalo Bill should return to scout his habitat around Cody, Wyo., today, he might be just a little shocked. The narrow, boulder-strewn Indian-infested passes have surrendered to the demands of modern transportation. Only 11 miles out of Cody, work on the Skull Creek

road is being pushed by the Taggart Construction Co.

Where herds of bison once roamed, today a herd of powerful Caterpillar diesel tractors pulling Le Tourneau pneumatic-tired scrapers is dotting the landscape, cutting a broad smooth highway through the hills. On a stretch of 1.2 miles, 112,000 cubic yards of earth is being moved, with round trip hauls of 3,000 feet made in an average time of 11 minutes.

Those monster dirt-moving units might at first glance hold more terror for the Great Plainsman than ever the Indians did, but once he understood their purpose, we believe that Buffalo Bill would approve of the rapid strides being made in the development of highways in his beloved West.

Water-Borne Silt Excavated in Transit

The vast project which the Bureau of Reclamation has started on the Colorado River about 15 miles northeast of Yuma, Ariz., at the Imperial Dam, will remove nearly 70,000 tons of suspended silt from close to 8 billion gallons of turbid Colorado River water every day. With a unit weight of 86 pounds per cubic foot, this means 1,640,000 cubic feet a day, a vast volume when compared with other great excavation and building projects. If poured into the 37,000,000-cubic foot Empire State Building it would fill every nook and cranny in about 22 days. In 50 days it would equal in volume the largest Egyptian pyramid, the 91,000,000-cubic foot pyramid of Cheops at Gizeh.

The world's greatest man-made excavation is the Bingham Canyon mine of the Utah Copper Co., not far from Salt Lake City, which just tops the 6,260,000,000-cubic foot Panama Canal.

The de-silting plant will consist of six huge settling basins, each approximately 769 feet long, 269 feet wide with an average depth of 14 feet, arranged in pairs. The removal of deposited silt is to be handled by seventy-two Dorr mechanically-operated clarifiers each 125 feet in diameter. These clarifiers will continuously plow the accumulating solids to outlets in the bottoms of the basins whence they will be continuously discharged into sluicing channels and returned to the Colorado River below the diversion dam.

Truck Mixers Improved

In a discussion of the latest developments in concrete paving equipment, E. M. Fleming of the Portland Cement Association recently pointed out the great improvement in truck mixers. The drums of truck mixers are now made shorter and of larger diameter, assuring a uniform distribution of ingredients throughout the batch. Methods of charging have been improved and the

charging time greatly reduced. Smaller sizes of truck mixers are now available although this is of more interest to the commercial mixing plant.

One of the most useful improvements to truck mixers is the hoist which lifts up the rear end of the drum, thereby increasing the chuting area and speeding up the discharge. Longer chutes have been added to take advantage of this.

Several outstanding jobs of the past few years were built with truck mixers having a side dump that discharged into a concrete distributor running on forms. In states that prefer to build concrete pavements one lane at a time or where there is room on the shoulder for the truck mixer, this type of equipment is very suitable. In fact, it seems probable that a distributor could be developed to run behind the standard paver and that it would improve the quality of the concrete as well as increase production.

Contractors equipped with a definite number of mixer trucks have frequently found them uneconomical for jobs requiring long hauls, both because the expensive piece of equipment was idle during a considerable part of the haul and because there were not sufficient trucks to keep the paving crew busy. For such jobs, a portable transfer plant has been built that makes it possible to haul batched aggregates in ordinary trucks, dump them into the transfer plant, and have them lifted mechanically to the drum of the truck mixer.

Hoag New Phila. Manager for Osgood Co.

J. G. Hoag who has been associated with the Osgood Co. for more than fifteen years and has been connected with the Philadelphia office of that company, has recently been appointed Manager of the Philadelphia Branch, located at 236 No. 23rd St., Philadelphia, Pa.

Mr. Hoag has had a broad experience in the field of excavating machinery, having been among the first to introduce Osgood revolving shovels, cranes and draglines on the Eastern Seaboard.

Improvements in Line of Centrifugal Pumps

A number of improvements in the line of Humdinger self-priming centrifugal pumps has recently been announced by the Ralph B. Carter Co., 53 Park Place, New York City. One of the features of these improved pumps, which are made in all sizes from 2 to 8-inch, is the elimination of a number of separate parts, particularly of all valves in the suction line at the pump or in the hose, which eliminates loss of prime because of valve sticking. Another feature is the more compact and pleasing design of the unit.

The inherent rugged construction of previous models of Humdinger pumps has been retained, and the new models are also equipped with double ball-bearing pump support head connected to the engine by means of a full flexible coupling which eliminates strain or load on the engine bearings.

Recently ten of these new units were purchased by the Queens, N.Y., County Sewer Department for general purpose work, including man-hole service.

Mammoth Materials Bridge for Grand Coulee

The engineering and construction feats at Grand Coulee seem always to require superlatives. The longest belt conveyor system, the largest sand and gravel plant, and so on! Outstanding even among these amazing achievements will be the mammoth suspension bridge

across the Columbia River which will carry the sand and gravel for the concrete for the dam.

It consists of two huge spans, with high steel towers, jointed and pivoted, and the cables weigh 9¼ pounds a foot.

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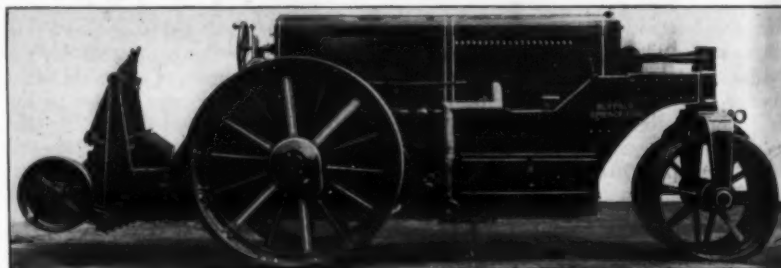
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● TO provide the best in Diesel power, BUFFALO SPRINGFIELD Rollers are standardly equipped with CUMMINS Diesel Engines. Unit illustrated is the 12-ton 3-wheel Roller, with close-up view of the 4-cylinder 55 H.P. CUMMINS Diesel installed.

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The Leader in Diesel Engineering Advancement

SALES AND SERVICE FROM COAST TO COAST

Good Roads
CHAMPION
SNOW PLOWS

"A Type and Model for every purpose"
ASK FOR CATALOG AND HAND-BOOK NO. 100

GOOD ROADS MACHINERY CORP., KENNETT SQUARE, PENNSYLVANIA

Handling Snow Problems in State of Ohio

(Continued from page 19)

crossings and other hazardous places. Preparation of the organization to fight ice and snow consists of arrangements to receive promptly information on weather and road conditions at all times of day or night, and for speedy communication with all snow plow or equipment operators so that work may start as soon as possible after the beginning of a snowfall or icy spell. All field maintenance forces understand that they are subject to immediate call at any hour of the day or night. Superintendents of Maintenance arrange in advance for relief drivers or for organizing into two or three shift operation, should such be necessary. Reserve forces are generally drawn from the regular maintenance organization. For snow plowing two men are sent out with each truck; for ice treatment three men are sent out with each truck.

During snow plowing or icy pavement periods, regular working hours are disregarded. However, every attempt is made to see that no crew works more than ten or twelve hours without relief. When the weather is extremely bad, crews work four hours on and eight hours off.

Equipment for 12,000 Miles of Road

The equipment used for the work, consisting of 485 truck plows, 8 tractor plows, 6 rotary plows and 180 spreaders, is distributed in as efficient a manner as possible to handle the work on 12,000 miles of state highways. Because Ohio does not have extremely heavy snows or snow drifts, the tractor plows and rotary plows are considered emergency equipment and are seldom used except when deep drifts do form and cannot be handled with lighter equipment.

Experiments in Thawing Ice

Experiments are being conducted with direct thawing of ice. Refuse salt has been used in extremely bad spots, being spread directly on the ice. Extensive experiments have been carried on, using a calcium chloride solution sprinkled directly on the ice. This solution, which consists of 50 pounds of calcium chloride dissolved in 50 gallons of water, when sprinkled on thin ice at the rate of from 100 to 200 gallons per mile, has thawed the ice sufficiently to be removed from the road with a motor patrol grader. This system seems to have possibilities and may be used more

extensively. It has the advantage that ice is completely removed from the pavement when the operation is completed. Unless it has unforeseen disadvantages, it appears like a very good way to handle thin sheet ice.

Improvements in Methods Needed

Snow removal and ice control are far from satisfactory in a large portion of the United States. Both can be handled much more satisfactorily when engineers and highway officials give it real thought and study. It will pay real dividends in increased gas tax revenues and certainly increase the appreciation of the traveling public for the efforts of the various highway departments to render real highway service.

One of the most important exhibits at the New England Road Builders Association Road Show was its large illuminated sign telling of the evils of diverting gas tax monies from highway work.

Design of Timber Bridges

The highway bridge engineer, when planning timber highway bridges, will do well to investigate the records of service of similar types of bridges already in existence, particularly on railroads, G. G. Wickline, Bridge Engineer of the Texas State Highway Department, pointed out in an article on the use of timber for highway bridges in a recent issue of *Wood Preserving News*.

In the planning of all highway bridges using creosoted materials, special care should be taken to provide a structure which will be adequate to take care of flood conditions as well as traffic, and also to safeguard against fire hazards as much as possible.

It should be the aim of the designing engineer to provide creosoted timber structures which will have a useful period of service of at least 25 to 30 years, depending upon the locality in which the structure is built. Of course, certain

features of the structure will have to be replaced at more frequent intervals, particularly the floor slab.

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at the digging end
Strength — in the all-welded chain crowd shovel boom — from the husky steel boom foot casting to the large diameter boom point sheaves revolving on anti-friction bearings.
Strength — from the full anti-friction bearing shipper shaft to the easy-filling full capacity all-manganese dipper.

DIESEL DRAGLINES

- 5 50-B Bucyrus Erie Diesel Draglines, 50 ft. boom, 10 ft. extension, Atlas engine, caterpillar mounting; one with shovel attachment.
- 3 775 P & H Diesel Draglines, 50 ft. boom, Atlas engine, caterpillar mounting.

The above are part of the surplus construction equipment of the Middle Rio Grande Conservancy District. Write or visit for list of all equipment, which includes pumps, compressors, lighting plants, tractors, shovels, pile driving outfit, concrete mixers, graders, inlay concrete placing outfit, concrete heaters and vibrators, gravel screening plant, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without skips, bar loaders and cutters, carbide floodlights, and other items at bargain prices.

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Send me full details and prices on equipment checked

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494 Galion Iron Works & Mfg. Co., Galion, Ohio will be glad to send to those interested complete information on the new Galion Junior Patrol motor grader which is a new, light, inexpensive machine designed especially for maintenance work, with an 8-foot moldboard and blade and powered by a McCormick-Deering I-12 industrial power unit.

Hard Facing Welding Rods

495 Amsco hard facing welding rods for resurfacing worn dipper teeth, crusher jaws, road ripper teeth, conveyor screws and other surfaces receiving unusually hard wear are described in literature which the American Manganese Steel Co., Chicago Heights, Ill., will be glad to send on request.

Power for Heavy-Duty Equipment

496 Hercules Motors Corp., Canton, Ohio, will be glad to send to those interested complete information on Hercules gasoline and diesel engines, which are designed to furnish dependable, efficient power for construction equipment.

All-Steel Hand Hoists

497 Complete information and the name of the nearest dealer for Beebe all-steel hand hoists, with a straight-line capacity of 5 tons, may be secured by interested contractors direct from Beebe Bros., 2724 Sixth Ave., South, Seattle, Wash.

Air-Operated Vibrators

498 Munsell air-operated concrete vibrators for all classes of concrete construction, including bridge deck slabs, dams and locks, highway pavements and concrete products, are described in literature which Munsell Concrete Vibrators, 997 West Side Ave., Jersey City, N. J., will send on request.

Electric Lighting Plants

499 LeRoi 5-kw dc direct-connected generating plant for furnishing electric current for lighting construction jobs is described in literature which may be secured direct from the LeRoi Co., Milwaukee, Wis.

Tarpaulins and Windbreaks

500 Catalogs, samples and prices on the Fulton line of tarpaulins and windbreaks, which are a necessary part of equipment for winter work, may be secured direct from Fulton Bag & Cotton Mills, Atlanta, Ga.

Pneumatic-Tired Concrete Carts

501 The Lansing K-4 concrete cart, features of which are its pneumatic-tired wheels and Timken roller bearings, with a capacity of 6 cubic feet of dry material, is described in literature which the Lansing Co., Lansing, Mich., will be glad to send on request.

Trailer-Type Air Compressors

502 Chrysler air compressors, with full automatic control and mounted on a two-wheel trailer-type chassis for easy portability, are described and illustrated in a new catalog which is available upon request from Chrysler Motors, Amplex Div., Detroit, Mich.

Rivers of Dirt

503 A very interesting 16-page booklet on the Grand Coulee Dam project, containing much interesting information about the project itself and also about the Jeffrey conveyor system for dirt moving and the aggregate plant, both of which are the largest belt conveyor systems ever constructed, has recently been issued by the Jeffrey Manufacturing Co., 949-99 No. Fourth St., Columbus, Ohio, who will be glad to send copies on request.

Sheet Concrete Pavements

504 Complete information on sheet concrete pavement, a patented process of laying monolithic concrete pavement, the surface of which is removable and replaceable, is contained in literature which the Sheet Concrete Pavement Corp. of America, 51 East 42nd St., New York City, will be glad to send on request.

Power Units for Construction Equipment

505 Le Tourneau power units, which are designed for fast and efficient operation of such construction equipment as bulldozers, scrapers, rotozers, buggies, derricks and similar units, are described in literature which R. G. Le Tourneau, Inc., Peoria, Ill., will be glad to send on request.

Facts on Lubrication

506 Copies of the Lubriplate Film, a bulletin published by the Fiske Brothers Refining Co., 24 State St., New York City, to answer lubrication questions and guide the manufacturer and user in his choice of proper lubricant, may be secured by those interested by writing direct to the company and mentioning this magazine.

Steel Bearing Piles

507 A complete description, specifications and advantages of CBP sections as steel bearing piles are contained in a well-illustrated 78-page booklet recently issued by the Carnegie Steel Co., Pittsburgh, Pa., which may be secured by contractors and engineers upon request.

New Catalog on Long-Range Cableways

508 A new 56-page catalog, describing and illustrating Sauerman long range machines, including drag scrapers, slackline cableways, Crescent hydraulic and drag scraper buckets and other equipment, and containing capacity tables and operating data, has recently been announced by Sauerman Bros., 464 So. Clinton St., Chicago, Ill., who will be glad to send copies on request.

Economical Contractors' Pumps

509 Hydrobalance pumps, the design of which is claimed to eliminate valves, floats, springs, adjustments and recirculation by its hydraulic balancing action, and which are made in a number of sizes and styles to meet the varying requirements of construction, are described in Bulletin No. 41 which the La Bour Co., Inc., Elkhart, Ind., will be glad to send on request.

Roads for 100 Miles an Hour

Instead of finding its main roads obsolete a few years after they are built, the State of Oregon is now designing them for a speed of 60 miles an hour in the mountains and 100 miles an hour in the valleys. Here is one highway department that intends not to be caught with obsolete roads. —The Highway Magazine

New A. I. S. C. Secretary

V. Gilmore Iden has been elected Secretary of the American Institute of Steel Construction by its Board of Directors. Mr. Iden, who joined the staff of the Institute in 1927 as its Director of Public Relations, has been serving in the capacity of Acting Secretary for the past year.

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JAEGE—Mixers, Hoists, Pumps, Tower Equipment
JEFFREY—Locomotives, etc.
JOHNSON—Blins, Batches, WHEELER

LAKEWOOD—Road Finishers, Forms, Chuting, etc.
LIMA—Power Shovels, Draglines, Cranes
LITTLEFORD—Asphalt Hoists
MacWHYTE—Wire Rope Multi-Foot Pavers
NORTH STAR—Snow Plows
SAUERMAN—Cableway Excavators, Drag Scrapers
SCHRAMM—Compressors
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CLEVELAND Trenchers
Erie Trenchers
Freeman Turntables
Hercules Power Units
Hyperpressure Jenny Cleaners
Hughes Road Rollers
Interstate Tramways
Iowa Crushers, Roadmix Pl.
Jasper Mixers, Hoists, Pumps
Johnson Blin, Batches
Jones Saw Benches

Klausen Snow Plows
Lakewood Road Finishers, Forms, Chuting
McKernan-Terry Hammers
McKernan-Terry Pile Drivers
Northern Conveyors
Page Dragline Buckets
Salem Oil Distributors
Schrann Concrete Mixers
Sun Ray Traffic Signals
Templeton, Kenty Braces, Jacks
Toledo Torches
United 5-T Hd. Winches
Walker Four-Wheel Dr. Trucks
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MINN. STL. & MACHY. CO.—Twin City Engines, parts
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Ransome Concrete Mash. Co.
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Rawls Mfg. Co.
Page Engineering Co.
Freeman Mfg. Co.
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Allis-Chalmers Mfg. Co.
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Sullivan Machinery Co.
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BUTLER Blin, Batches
CARBID Lights
CHICAGO PNEUMATIC Air Compressors
DOMESTIC Pumps, Hoists
GENERAL ELECTRIC Motors
HERCULES Road Rollers
HYPERPRESSURE JENNY Vapour Cleaning Machine

JAEGE Concrete Mixers, Pavers, Road Machinery
JONES-SUPERIOR Saw Rigs
LAKEWOOD Road Machinery
LIDGERWOOD Hoists
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LITTLEFORD Asphalt Plovers
MUNDY Hoisting Equipment
BUFFALO-SPRINGFIELD Road Rollers

HOUGH-UNIVERSAL Sweepers
INGERSOLL-RAND Air Compressors, Tools
KILLEFER Road Ripper, Drag Scrapers
LA PLANT-CHOATE Crawler Dump Wagons, Bulldozers
McKERNAN-TERRY Pile Drivers
WINSLOW Scales
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AMERICAN HOIST Crawler Cranes, Shovels, Draglines, Bulldozers, Snow Choker Hooks
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INGERSOLL-RAND Air Compressors and Tools
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GORMAN-RUPP CO.—Self-Priming Centrifugal Pumps
MICHIGAN POWER SHOVEL CO.—Crawler Shovels, Cranes, Truck Shovels, Cranes, ¾-yd.
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INGERSOLL-RAND—Compressors, Tools
LA PLANT-CHOATE—Wagons, Scrapers, Bulldozers
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PAGE—Dragline Buckets
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HOUGH-UNIVERSAL—Sweepers
SULLIVAN—Air Compressors, Tools
TRACKSON—Crawlers, Shovels and Bulldozers
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Eucuid Crane & Hoist Co.
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DuPont Explosives
Dobbie Derricks
Elastic Expansion Joint
Euclid Scrapers
Farquhar Engines, Boilers
General Electric Motors
Gulf States Reinforcing Steel
Hansen Excavators
Hauk Hesters and Thawers
Johnson Blin and Hoppers

LeROI Gas Engines
Lidgerwood Hoisting Mach.
Link-Belt Cranes, Shovels
Northwest Shovels, Cranes
Novo Pumps and Hoists
Oxwell Apparatus
Page Buckets
Rogers Bros. Trailers
Sargen Derricks
Sauerman Scrapers
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Worthington Shovels
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CAMERON Centrifugal Pumps
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GENERAL ELECTRIC Motors, Arc Welders, etc.
HYDROL Goulds Oil Purifiers
INGERSOLL-RAND Air Compressors, Pneu. Tools, Pumps, Engines
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MERRELL Pipe Machines

Reduction Gears
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SUMMIT Hoisting Engines
NOVO Engines, Hoists, Pumps
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SHAW BOX Hoists, Cranes
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STEPHENS-ADAMSON Conveyors
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GALION Graders, Rollers
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chines, etc.
McCORMICK-DEERING
Industrial Tractors
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"CATERPILLAR" Road Machinery
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LeRoi-Rix Compressors
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Dump Wagons
Le TOURNEAU - Dirt
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KILLER-Head Rippers,
Scrapers
ATHEY-Crawlers, Dump
Wagons, Trailers
BUCKYRUS-ERIE - Power
Shovels, Cranes, Draglines
PIONEER-Crusher, Gravel
Plants
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Drills
Shelton-Shovels
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Symons-Column Clamps
Winlow-Weighing Scales
Universal-Form Clamps
Link-Belt-Cranes, Shovels,
Draglines
New-Pumps
Vulcan-Steam and Drop
Hammer
Waukena-Engines
Mall-Vibrators and Grind-
ers
Archer-Tower Equipment
Red Star-Wheelbarrows
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Allis-Chalmers Mfg. Co.
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Lin Mfg. Corp.
Sven Buckel Co.
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Bucyrus-Erie Company-Shovels, cranes, draglines
Chain Belt Co.-Mixers, pavers, pumps
Caterpillar Tractor Co.-Tractors, graders, road machinery
D. A. Lubricant Co.-Lubricants
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Gardner-Denver Co.-Air compressors and tools
Killer Mfg. Corp.-Road and farm tools
LaPlant-Choate Mfg. Co.-Bulldozers, backfillers, wagons,
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Iowa Manufacturing Co.
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HUMPHREYS-Pumps
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McLANAHAN & STONE-Crushers, Screens
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Asphalt and Rubber Expansion Joint
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Forms, Towers
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NORTHWEST-Cranes,
Shovels, Draglines
CENTAUR-Hoist Mowers
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pressors, Drills, etc.
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Mfg. Co.
Butler Bin Company
Clyde Sales Company
Galton Iron Works
Page Engineering Co.
American Steel & Wire Co.
Burch Corporation
Hess Snow Plows
Sagen Derrick Company
Sawman Brothers
Syntron Company
LeRoi Company
Aeroli Burner Company
Connelly & Company
Jones-Superior Company
Moritz-Bennett Company
Ames Shovels
Rosa Manufacturing Co.
Red Top Steel Post Company
Toledo Pressed Steel Co.
Bates Wire Ties
Electric Taper & Equip.
Co.
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Kewanee Machinery & Conveyor Co.
Kob Manufacturing Co.
McKernan-Terry Corp.
Northwest Engineering Co.
R. B. Equipment Mfg. Co.
Sullivan Machinery Co.
Vulcan Locomotive Works
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Distributors of
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Bucyrus-Erie Shovels, Drag-
lines and Cranes
Bucyrus-Erie Loadmasters
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ing
Buffalo-Springfield Road
Rollers
D-A Lubricants, Oils
Hewitt Belling, Hose
Tractor-operated Hoists, Scrapers, Dismanters, Rippers,
Scarfiers, Bulldozers, Trailbuilders, Backfillers, Snow
Plows, Loaders, Track-type and Wheeled Wagon and
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Member: Associated Equipment Distributors

THE HENRY H. MEYER CO.

110 S. Howard St., Baltimore, Md.

Representing
Blaw-Knox Co.
Bates & Lippert Bl. Co.
Byers Machine Co.
Phillips Carey Co.
Chas. Oil Burner Co.
Connelly & Co., Inc.
Domestic Eng. & Pump Co.
Dobbs Fdy. & Mach. Co.
Duff-Norton Mfg. Co.
Galton Iron Wks. & Mfg. Co.
A. B. Farquhar Co., Ltd.
Harrington Co.
Ingersoll-Rand Co.
A. Leach & Sons Rope Co.
Lidgerwood Mfg. Co.
Pierce Equip. Co.
Pulsometer Steam Pump Co.
Ransome Concrete Machy.
Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton, Kelly & Co.
Union Iron Works
Universal Road Machy. Co.
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tors, Graders, Wagons,
Power Units
BERG-Concrete Finishers
CLEVELAND-Air Tools
DIAMOND-Crushers,
Gravel Plants, Washing
Equipment
FLECKLE-Road Joint
Machinery
FOUR-WHEEL DRIVE-
Trucks
HETZEL-Forms, Bins,
Batches
HOUGH-UNIVERSAL-
Road Sweepers
HUBER-Rollers
INSLEY-Towers, 1/4-yd.
Shovels
KOEHRING-Shovels,
Cranes
KWIK-MIX-Mixers
LITTLEFORD-Kettles,
Heaters, Asphalt Machin-
ery Distributors
MATSON-Snow Fence
MACWHYTE-Wire Rope
NOVO-Engines, Pumps,
Hoists
PARSONS-Trenchers,
Backfillers
SCHRAMM-Air Compres-
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SHOVELS, PICKS and
SMALL TOOLS
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BUNL CO.-Portable Air Compressor
CHAMPION RIVET CO.-Rivets and Welding Rod
DETROIT HOIST & MACH. CO.-Air and Electric
Hoists
DEVLISSE CO.-Paint Spray Equipment
HARDSDGS WONDER DRILL CO.-Rock Drills and
Drill Struckers
WM. H. KELLER, INC.-Super Pneumatic Tools
MUNSELL-Air-Operated Concrete Vibrators
PANGBORN CO.-Sandblast Equipment
PENNSYLVANIA-Air Compressor and Pumps
DAVID ROUND & SON-Chain Hoists
STAYNEW-Air and Pipeline Filters
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VAN DORN-Electric Drills, Grinders and Buffers
VICTOR-Welding and Cutting Apparatus
WESTINGHOUSE-Arc Welding Equipment
GUSTAV WIEDEKE CO.-Tube Expanders
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Billings Montana

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BARBER-GREENE-Crusher, Ditchers and Loaders
DIAMOND IRON WORKS-Gravel Equipment
BRENNER-Rippers and Scarifiers
WOOD-Wire Snow Fence
HYSTER-Hoists and Winches
LANING-Scrapers, Fresnoes and Barrows
SCHRAMM-Compressors
WHEELING CORRUGATING CO.-Metal Culverts
LOEBING-Grooved, Drag and Concrete Mixers
INDUSTRIAL & TRUCK FLARES
BRODERICK & BASCOM WIRE ROPE CO.-Wire Rope
and Cable
ROSCO-Trail Dumpers and Oiling Equipment
WM. BROS MFG. CO.-Snow Plows and Rollers
GOODRICH-Transmission and Conveyor Belting
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CLEVELAND-Rock Drills
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Representing
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BLAW-KNOX-Steel Forms, Bins, Buckets, "Ord" Fin-
ishers
CARTER-"Humdinger" Pumps
INGERSOLL-RAND-Air Compressors
ORR-SENBOWER-Hoists, Boilers, Mixers
ROBB-Shores and Clamps
RAISS-Elevators, Conveyors and Loaders
ALLIS-CHALMERS-Tractors
BAKER-Bulldozers
SARGENT-Pumps
REESE BROS.-Hoists
CLEVELAND-Formgraders
C. B. JAHN CO.-Trailers
BURCH-Road Plows, Road Machinery
HOMESTEAD-Hypersure Jenny Cleaner
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Snow Plows
Blaw-Knox Bins, Forms,
Buckets, Finishers
B-B Hand Hoists
Clyde Hoists, Derricks
Cleveland Formgraders
Diamond Crushers, Screens
Domestic Pumps
Eastlid Wagons, Scrapers
Gopher Road Signs
Hais Loaders
Hercules Road Rollers
Hough-Universal Sweeper
Koppel Industrial Cars
McKernan-Terry Pile Ham-
mers, Extractors
M-W Lubricants
Michigan Power Shovel
Northern Conveyors
Northwest Shovels, Cranes
Oshkosh 4-wheeled Dr. Trucks
"RB" Power Subgraders
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Toro Highway Mowers
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Davey Compressor and Pumps
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Killer Mfg. Co.
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Pioneer Gravel Equip. Mfg. Co.
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Chain Belt Co.
Climax Engineering Co.
Eagle Corporation
Etnyre & Co.
Galton Iron Works & Mfg.
Co.
Gardner-Denver Co.
Goodyear Tire & Rubber
Co.
Hanson Trailers
Hazard Wire Rope Co.
Madsen Iron Works
Marmon-Harrington Co.,
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Molok Asphalt Heater Co.
Novo Engine Co.
Ramsey Winches
Rotary Snow Plow Co.
Sawman Bros., Inc.
Smith Engineering Works
Thew Shovel Company
Timken Roller Bearing Ser-
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Jas. F. Kinler Co.
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Ingersoll-Rand Compressors and Tools
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COMPLETE RENTAL SERVICE
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Caterpillar Road Machinery
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Bulldozers, Snow Plows,
Scrapers
Keystone Excavators, Blast
Hole Drills
Diamond Gravel Crushing,
Screening, Washing
Plants, Conveyors
Killer Scrapers, Road
Discs, Bippers
Davey Air-Operated Air Com-
pressors
CLEVELAND Rock Drills
Lambert
Ames Baldwin Wyoming Hand Shovels
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Erie Steel Construction Co.
Gardner-Denver Co.
General Wheelbarrow Co.
Lyle Signs, Inc.
Mail Tool Co.
Toledo Pressed Steel Co., Inc.
Contractors Machinery Corp.
Erie Steel Engine & Pump Co.
Diamond Iron Works, Inc.
Orr & Sembower, Inc.
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Complete Line of Road Machinery
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PARSONS-Trenchers
T. L. SMITH-Mixers and
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INSLEY-Concrete Towers
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PANTHER-Oil and Grease
CLEVELAND-Rock Drills
STEEL BRIDGES and TRAFFIC TREAD
OWEN-Buckets
COLEMAN-Trucks
SCHRAMM-Air Compres-
sors
PIONEER-Gravel Equip.
MACWHYTE-Rope, Pumps,
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JAEGER Concrete Mixers
JAEGER Placing Plants
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Air Compressors
Gasoline Hoists
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HELTZEL Road Forms and Bins
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MARLOW Centrifugal, Diaphragm and Plunger Pumps
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HANSON—Excavators
INGERSOLL-RAND—Air Compressors
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STANLEY Electric Drills, Saws, etc.
THURSTON Detachable Bits
VULCAN Pile Hammers, Extractors and Parts
WILEY and BLAW-KNOX Concrete Buckets
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140th St. & East River Bronx, N. Y.

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MARION Shovels— $\frac{1}{2}$ to 3-yd. SPEEDER Shovels, $\frac{1}{2}$ to
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LAPLANT-CHOATE Wagons LaROI Compressors and Rh-
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BLAW-KNOX Scoops HELTZEL Steel Bins
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JAEGER MACH. CO.—Truck Mixers, Finishing
Machines, Road Forms, Spreaders
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and Chip Spreaders
ERIE STEEL CONSTRUCTION CO.—All-Steel
Bins, Complete Aggrement Plants, Erie
Buckets, Clamshell, Dragline and Electric
IOWA MFG. CO.—"CEDAR RAPIDS" Crush-
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Asphalt Plants
THE KRON CO.—Full-capacity Springless Dial
Scales**BREWSTER & WILLIAMS, INC.**

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BUTLER Bins and Measuring Hoppers
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HAISS Loaders, Excavators, Conveyors and Buckets
HOTCHKISS Steel Forms
LITTLEFORD Asphalt Heaters and Tools
RANSOME Mixers, Pavers, Towers and Chutes
ROGERS Trailers
SULLIVAN Compressors, Drills and Hoists
WEHR Power Graders

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German Rupp Co.
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Cleveland Rock Drill Co.
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Foundry Co.
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Euclid Road Machy. Co.
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Gallion Iron Wks. & Mfg. Co.
Gallion Alsteel Body Co.
Good Roads Mach. Corp.
Hanson Clutch & Machin-
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GORMAN-RUPP—Centrifugal Pumps
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BLAW-KNOX—Steel Forms, Bins, Buckets, Truckmixers
BARBER-GREENE—Conveyors, Car Unloaders
DIAMOND—Roll, Jaw Crushers
HERCULES—Gas Road Rollers
LAPLANT-CHOATE—Wagons, Bulldozers
SLUSSER-MACLEAN—Wheelers, Rippers, Presses
TREW—Shovels, Cranes
WONDER—Mixers, Pumps, Hoists

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Representing

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Chain Belt Co.—Box Pavers, Moto-Mixers, Building Mi-
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Northwest Engineering Co.—Gasoline Shovels, Cranes,
Draglines, Full Shovels
Ingersoll-Rand Co.—Compressors, Pneumatic Tools, Pumps
Clyde Sales Co.—Hoisting Engines, Derricks
Drave-Doyle Co.—American Tubular Towers
Sauerman Bros., Inc.—Cableways, Power Scrapers, Eng-
savers
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Wellman Engineering Co.—Clamshell, Dragline Buckets
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GENERAL—Shovels, Cranes, Excavators, etc.
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KILLEFER—Road Rippers and Rooters, Road Dism.
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JOHNS-SUPERIOR—Portable Saw Tables, etc.
COLUMBUS—Elevators and Conveyors
SIMPLICITY—Screens
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THE DAVEY COMPRESSOR CO.—Air-Cooled
Compressors
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THE WALSH SNOW FLOW CO.—Snow Plows
D-A LUBRICANT CO.—Oil
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Equipment Headquarters

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Representing

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American Terry Derricks Kelley Fleet Machines
American Scrapers & Road Keiskerhooker Mixers
Drags Wall Vibrators & Grinders
Barnes Pumps National V-G Carbide Lights
Cleveland Formgraders Sauerman Crescent Scrap-
Gorman-Rupp Self-Priming ers & Blocks
Centrifugals Sterling Wheelbarrows
Hais Loaders Sullivan Compressors, Tools
Hill Road Rollers & Hoe
Independent Pneumatic & Teepfer Screens
Electric Tools Toledo Turches
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Cranes
Ransome Concr. Machy. Co.—Pavers, Constr. Mixers, Tow-
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Baldwin Locomotive Works (Internal Combustion Divi-
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Tampers
Meritz-Bennett Corp.—Road Shoulder Finishers, Form
Fullers
Concrete Surfacing Machinery Co.—"Berg" Surfacers
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Fuller & Johnson Mfg. Co.
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Waco Electric Co. Pieren-Governor Co.
Portable Power Tool Corp. Hercules Prod. Co.
LeROI Co.**W. T. WALSH EQUIPMENT CO.**

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Barnett Company—Crushers Pile Hammers
Cleveland Rock Drill Co.— Pile Hammers
Air Tools Michigan—Power Shovels
Diamond Iron Works—Light Plants
Crusher Plants Rones Mfg. Co.—Hance Dis-
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—Wagons
Foote Company—Pavers General Excavator Co.—
Shovels
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White Mfg. Co.—Chausse- Williams Engineering Co.—
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Heaters

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Kleber Manufacturing Corp.
Baker Manufacturing Co.
Williamette-Ersted Co.
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PENNA. BOILER WORKS—Boilers
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Heltzel Steel Form & Iron Co.—Bins, Batches
Chas. Hvas & Co., Inc.—Distributors
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Jaeger Machine Co.—Mixers, Concrete
Lakewood Engineering Co.—Handling Equipment
Linn Manufacturing Corp.—Linn Tractors
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Hewitt Rubber Corp.—Hose and Belts
Georgia-Carolina Oil Co.—Tractor Lubricants
Independent Pneumatic Tool Co.—Pneum. & Elec. Tools
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JACKSON Concrete Placement Vibrators
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RICHMOND SCREW ANCHOR CO.—Concrete Specialties
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PEDLAR PEOPLE'S Culverts

Contractors and Engineers Monthly



Above, Hand Labor Working on a New Highway Between Hsinking, Capital of Manchukuo, and Kirin. The Road Will Have a Sand Base and Asphalt Top.

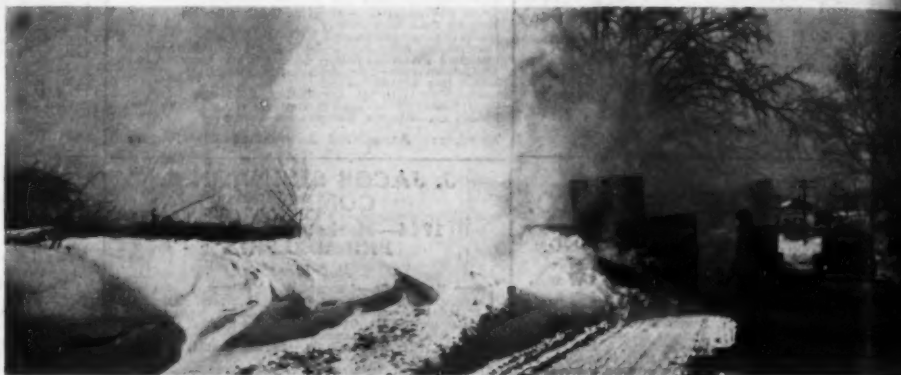


A Distinct Contrast to Dirt Moving by Basket Is the Modern Tractor and Wheel Scraper Outfit Working on Another Section of the Same Road.



On the "Graveyard Shift", an Arc Welding Operator Climbs into Maw of Huge Dragline Bucket to Apply New Surfaces to Its Worn Teeth. See also Page 11.

Bucking a Snow Drift on an Ohio State Highway with a V-Type Plow and Tractor. A Complete Description of Ohio's Snow Fighting Organization Appears on Page 8.



This Is Not the Beginning of a Race Track But Is a Novel Method of Mixing Material for the Maintenance of Road-Mix Highway Surfaces in Arizona.

The Patrol Grader That Patiently Makes the Circuit Shown with All the Material Moved to Outside Ready to Blade Toward the Center. See Page 2.



C. & E. M. Photo

A Power-Operated Elevating Grader, Hauled by a Diesel Tractor, Loading One of the Ten Wagons on a 50,000-Yard Grading Job West of Comanche, Okla. Read Article on Page 14 for Some Interesting Fuel Costs.



C. & E. M. Photo

This 8-Yard Walking Dragline of Martin Day Co., Lincoln, Nebr., Is One of a Flock of Big Excavators Working on the Loup River Power Project in Nebraska. See Page 1.



Photo—Lincoln Electric Co.

Butt-Welding Two Sections of a Tower in the Construction of the New \$500,000 Rock River Valley Steel Bridge on Lorain Road, Cleveland, Ohio.